US009192524B2

(12) **United States Patent**
Orchard, IV et al.

(10) **Patent No.: US 9,192,524 B2**
(45) **Date of Patent: *Nov. 24, 2015**

(54) **ABSORBENT INSERT WITH POSITIONING NOTCH**

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(73) Assignee: **Kimberly-Clark Worldwide, Inc.**, Neenah, WI (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 217 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **13/678,270**

(22) Filed: **Nov. 15, 2012**

(65) **Prior Publication Data**

US 2014/0018761 A1 Jan. 16, 2014

Related U.S. Application Data

(63) Continuation-in-part of application No. 13/548,012, filed on Jul. 12, 2012.

(51) **Int. Cl.**
A61F 13/505 (2006.01)
A61F 13/49 (2006.01)

(52) **U.S. Cl.**
CPC ***A61F 13/49006*** (2013.01); ***A61F 13/505*** (2013.01)

(58) **Field of Classification Search**
CPC A61F 13/505; A61F 13/74; A61F 13/76; A61F 13/471; A61F 13/78; A61F 2013/5055; A61F 13/15268; A61F 13/49003; A61F 13/491; A61F 13/49413; A61F 2013/15121; A61F 2013/4955; A61F 13/66; A61F 13/68; A61F 13/49006; A61F 13/84; A61F 2013/5694; A61F 2013/51468; A61F 5/4401; A61F 2005/4402; A41B 13/04; A41B 9/02; A41B 9/12
USPC 2/82, 238, 228, 227, 400, 403, 406, 2/408; 604/393–402, 385.14
See application file for complete search history.

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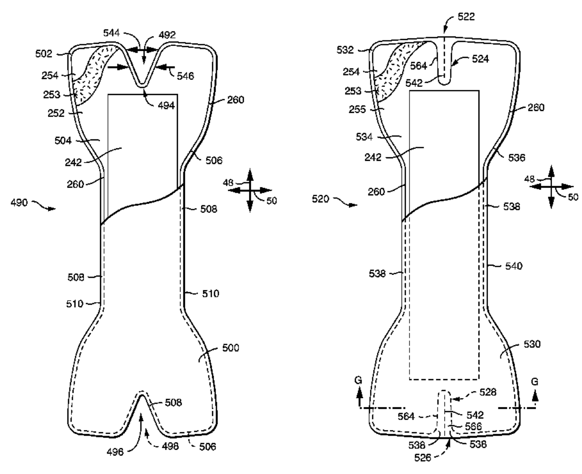
Assistant Examiner — Peter S Vasat
(74) *Attorney, Agent, or Firm* — Kimberly-Clark Worldwide, Inc.

(57) **ABSTRACT**

A discrete absorbent insert includes a first sheet, a second sheet in facing relation with the first sheet, and an absorbent core positioned between the first sheet and the second sheet. The absorbent core defines a core perimeter which includes a first absorbent core positioning notch. The first sheet and the second sheet extend beyond the core perimeter and are joined together to form a perimeter seal. The perimeter seal defines an absorbent insert perimeter which includes a first absorbent insert positioning notch. The first absorbent core positioning notch has a depth of 30 to 60 mm, the first absorbent insert positioning notch has a depth of 30 to 60 mm, and the first absorbent insert positioning notch is aligned with the first absorbent core positioning notch.

19 Claims, 58 Drawing Sheets



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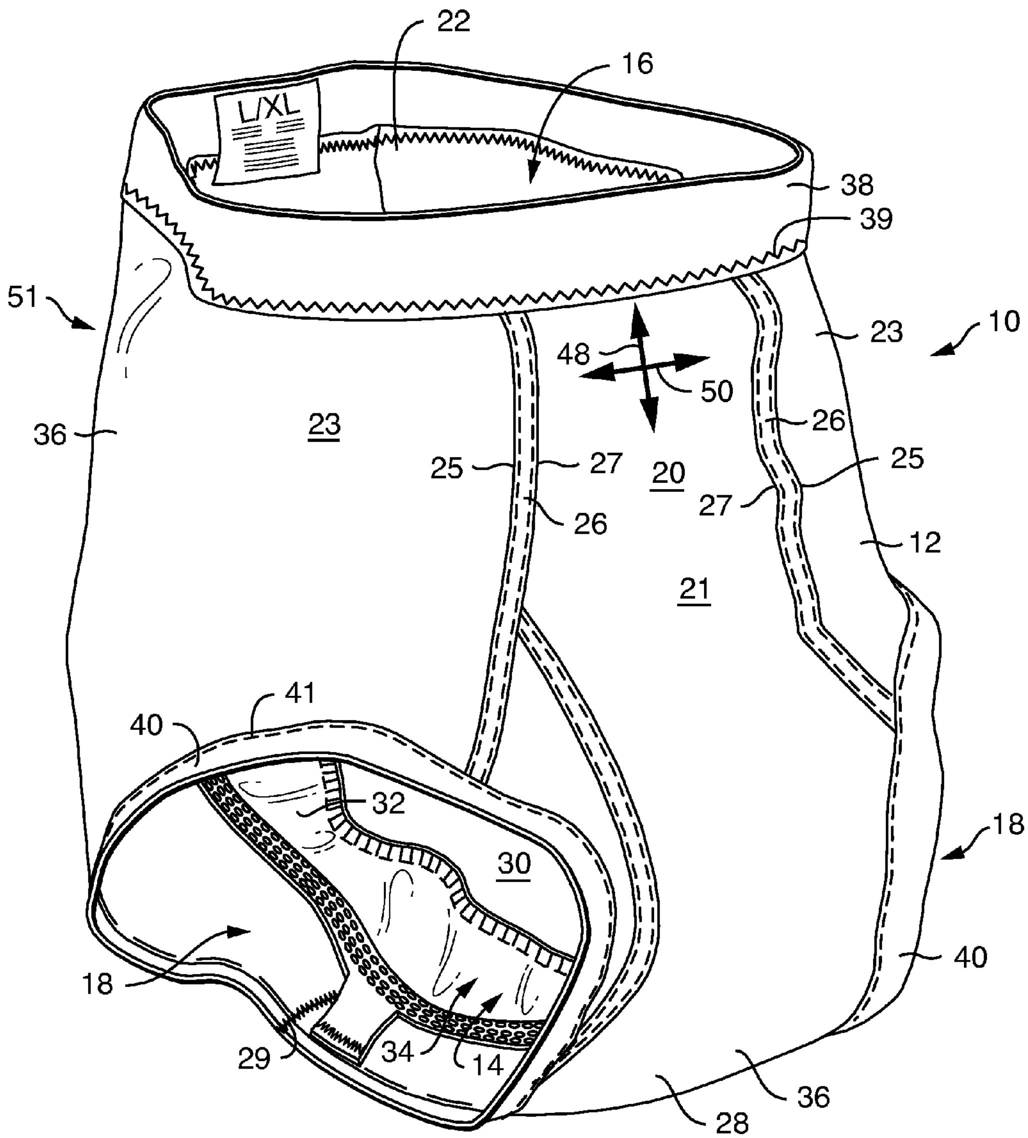
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FIG. 1

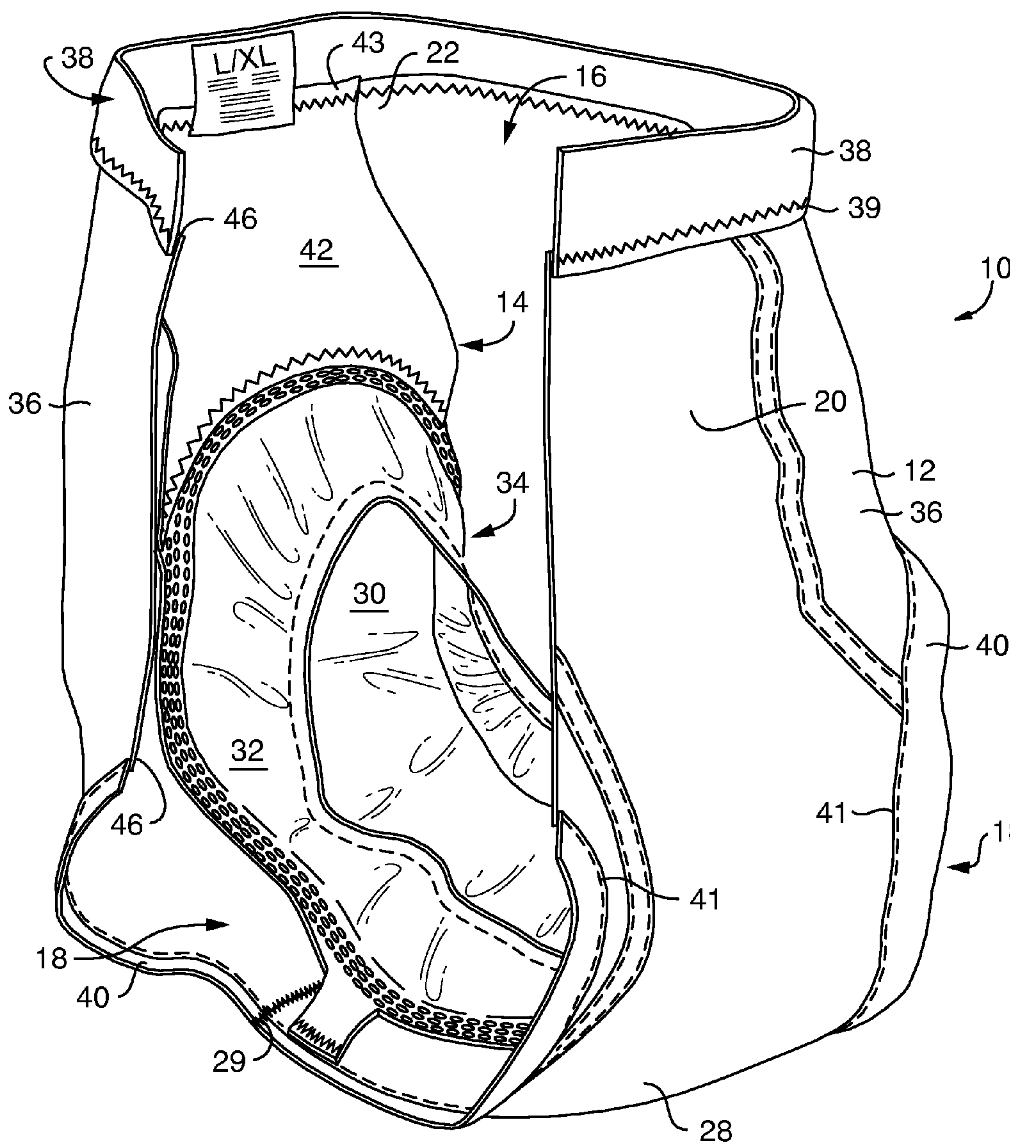
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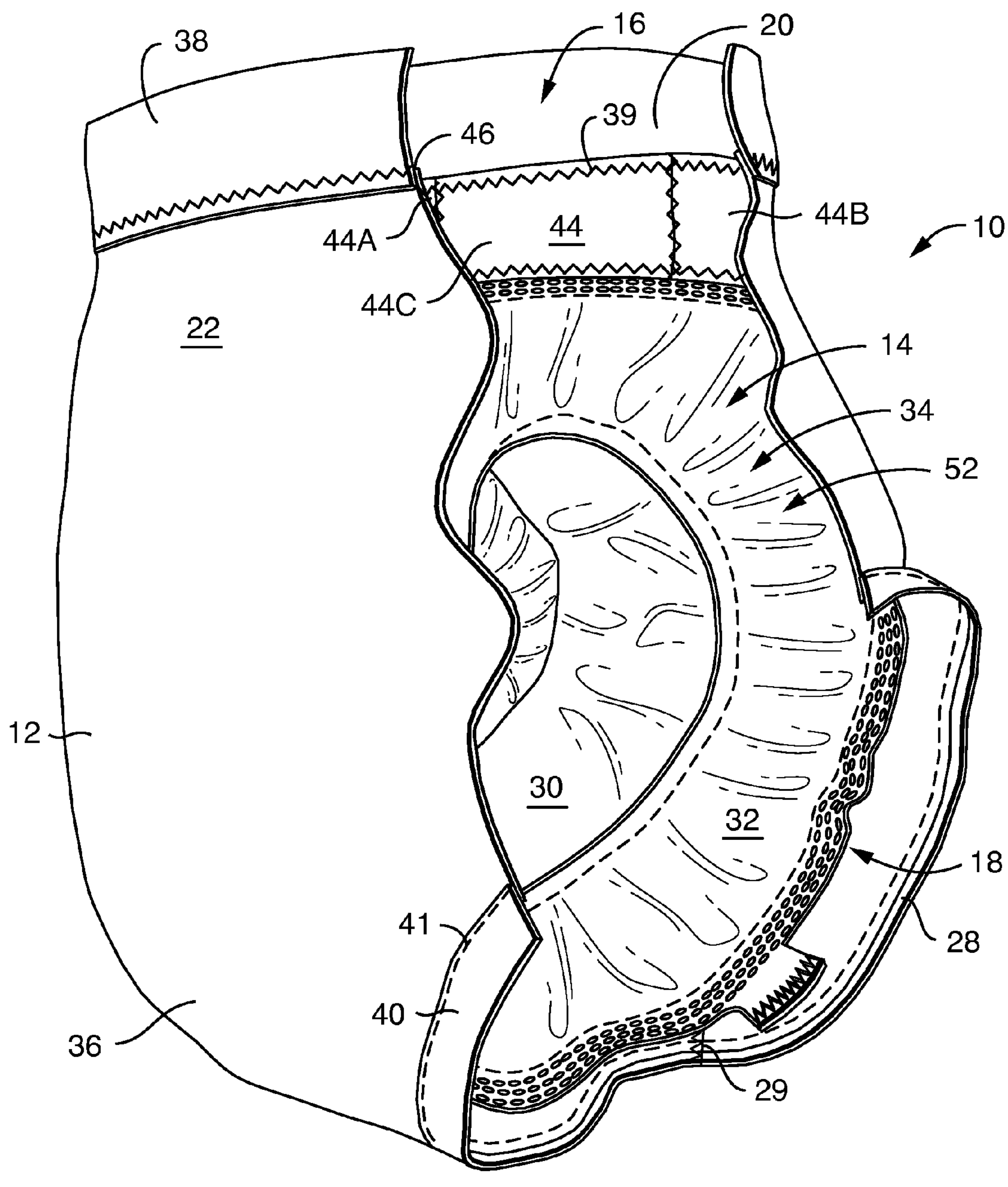
FIG. 2



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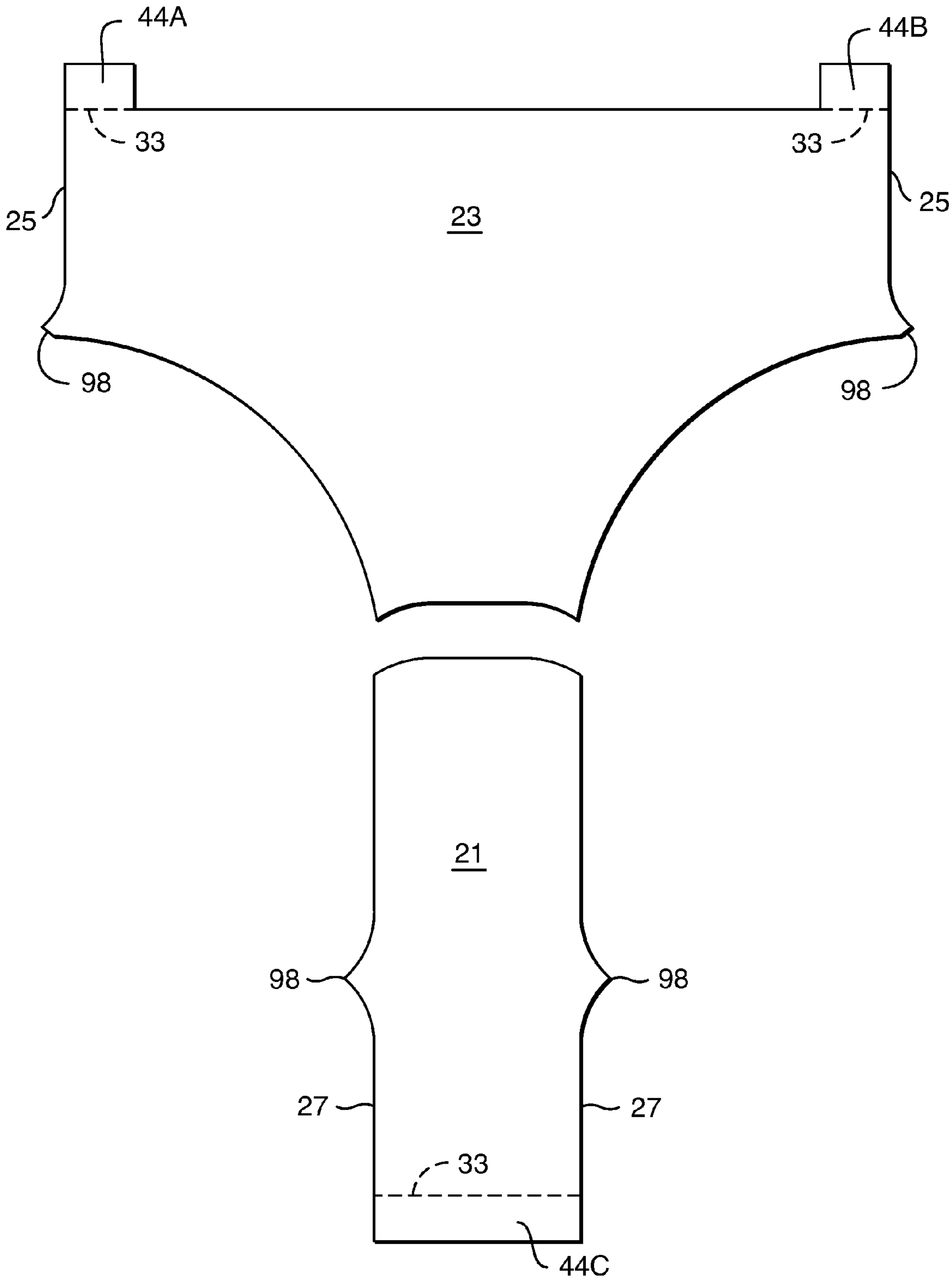

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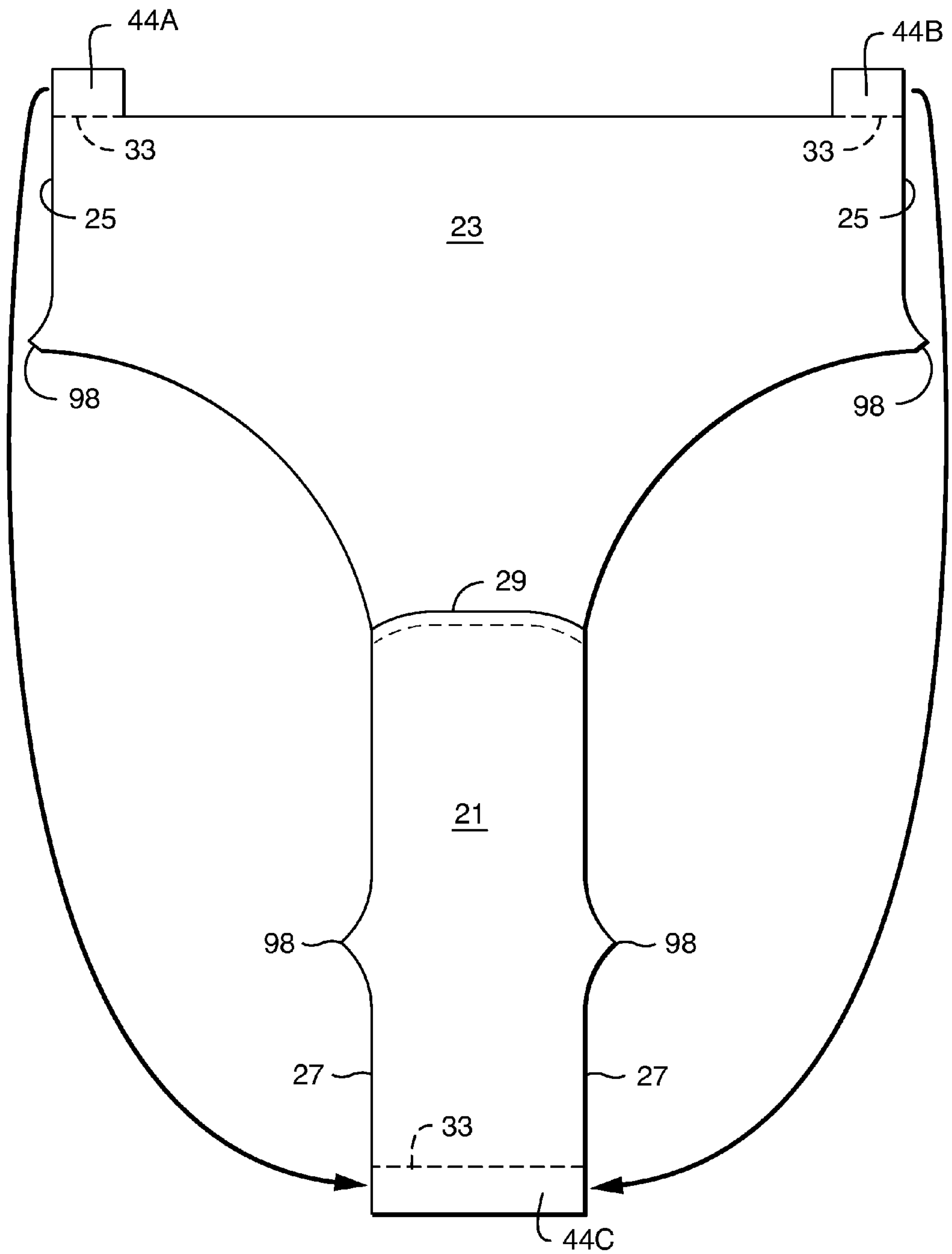

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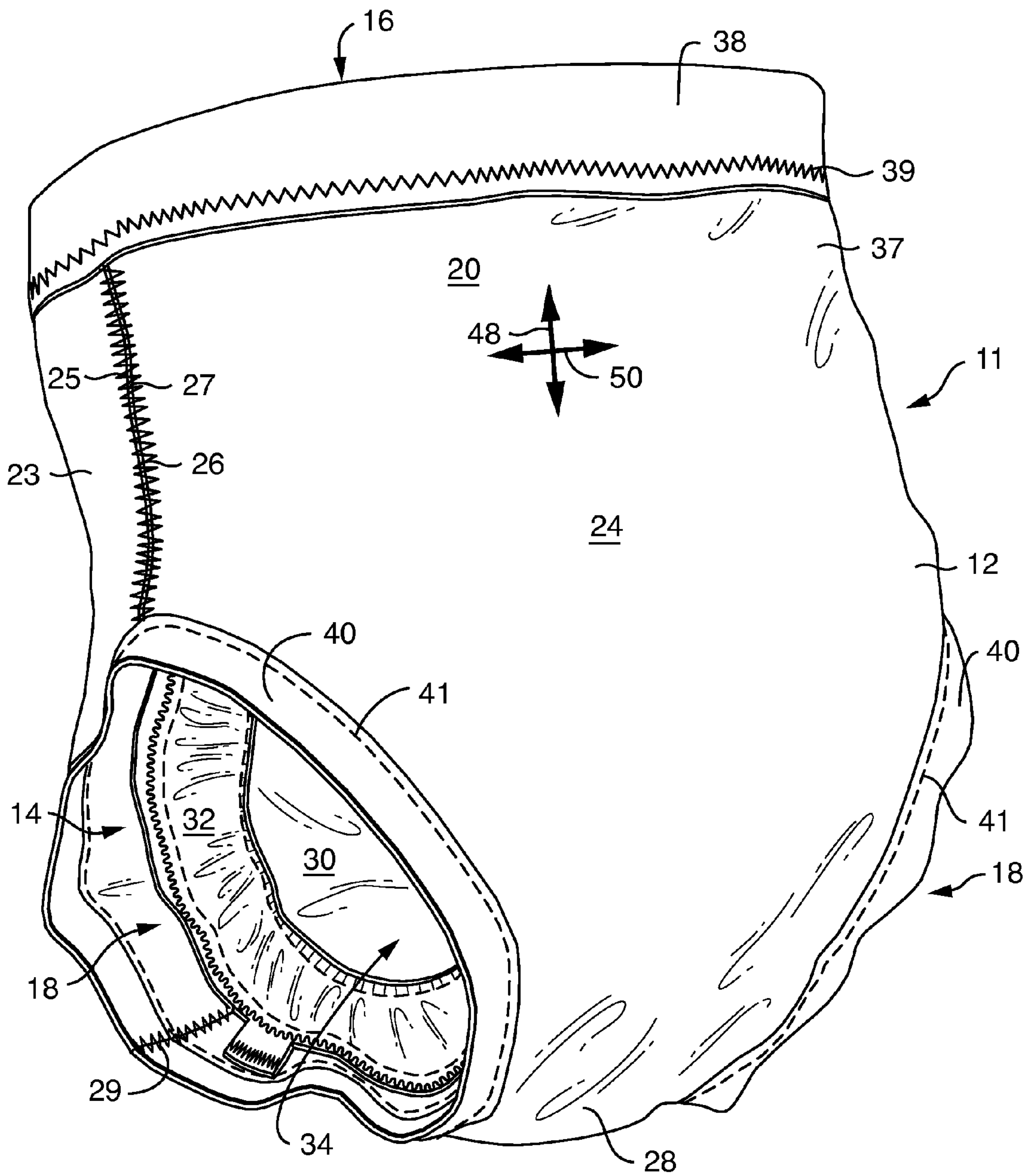
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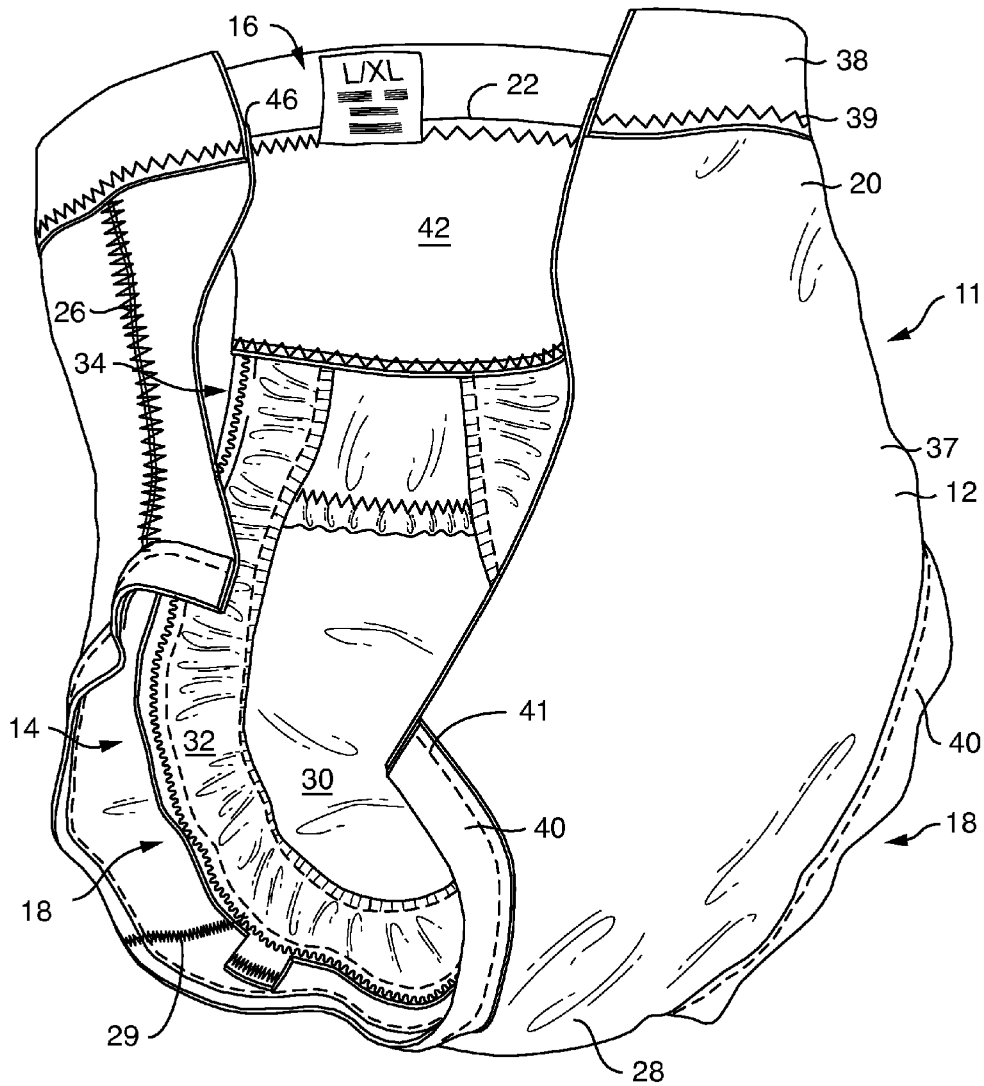
FIG. 6



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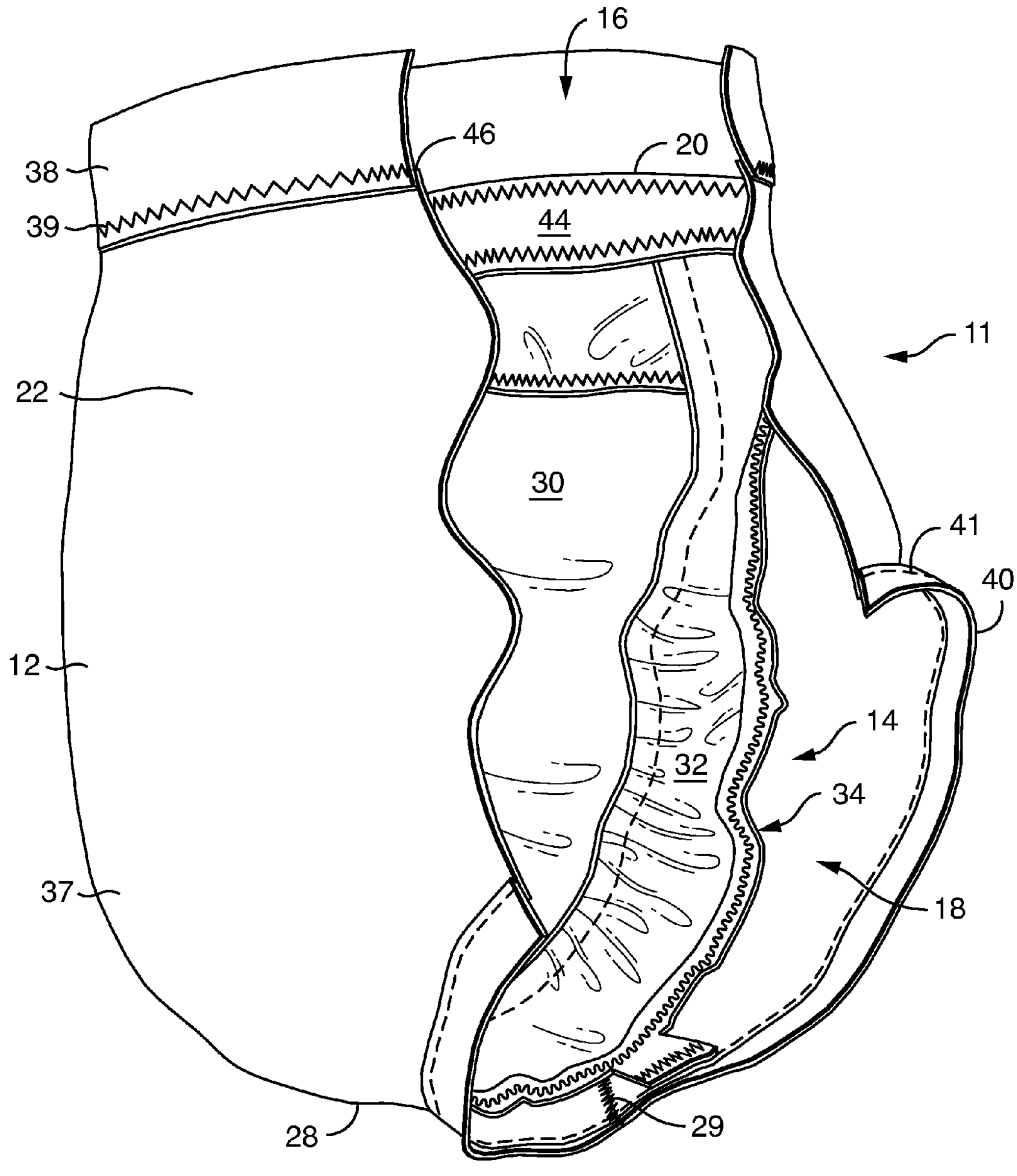

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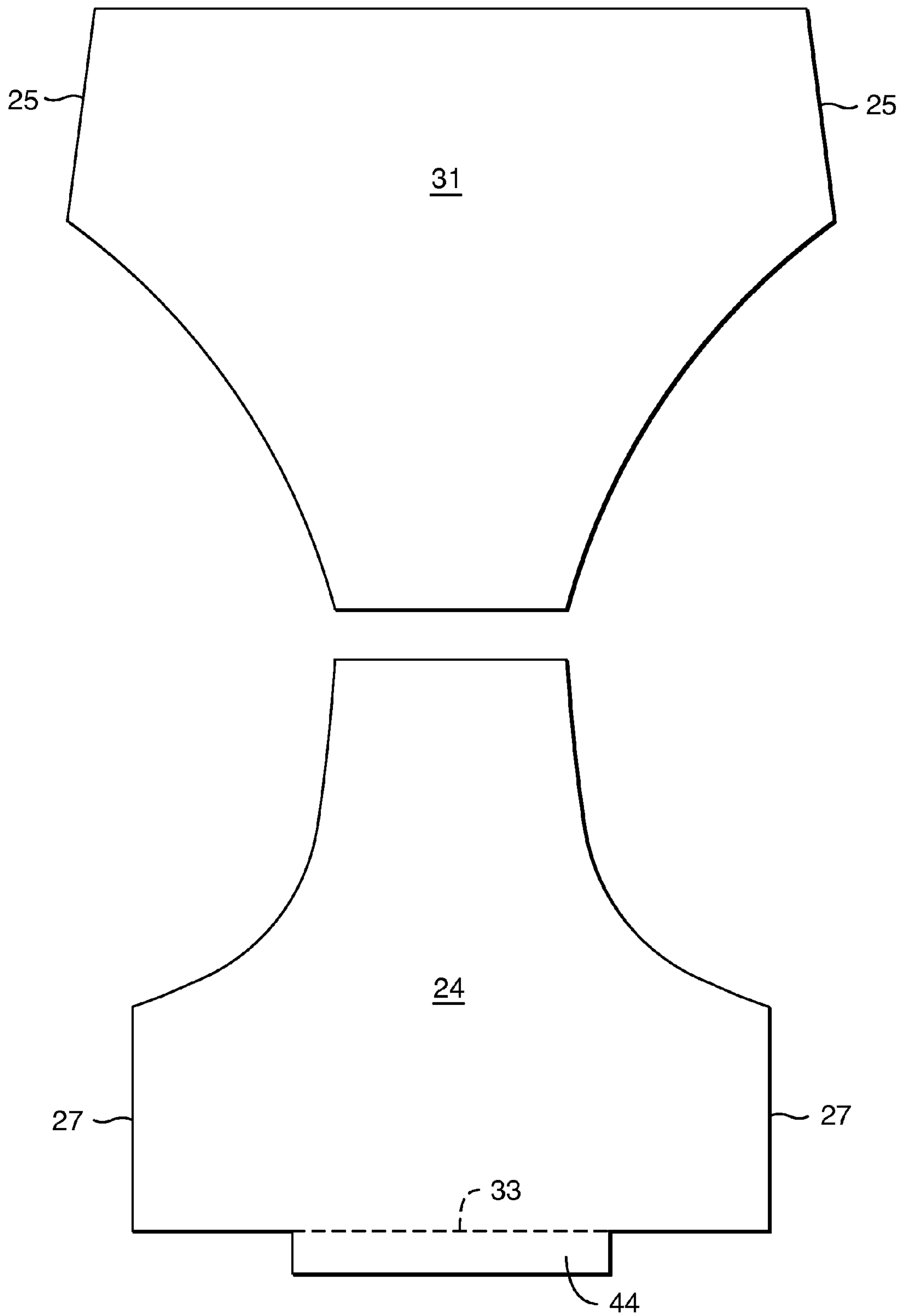

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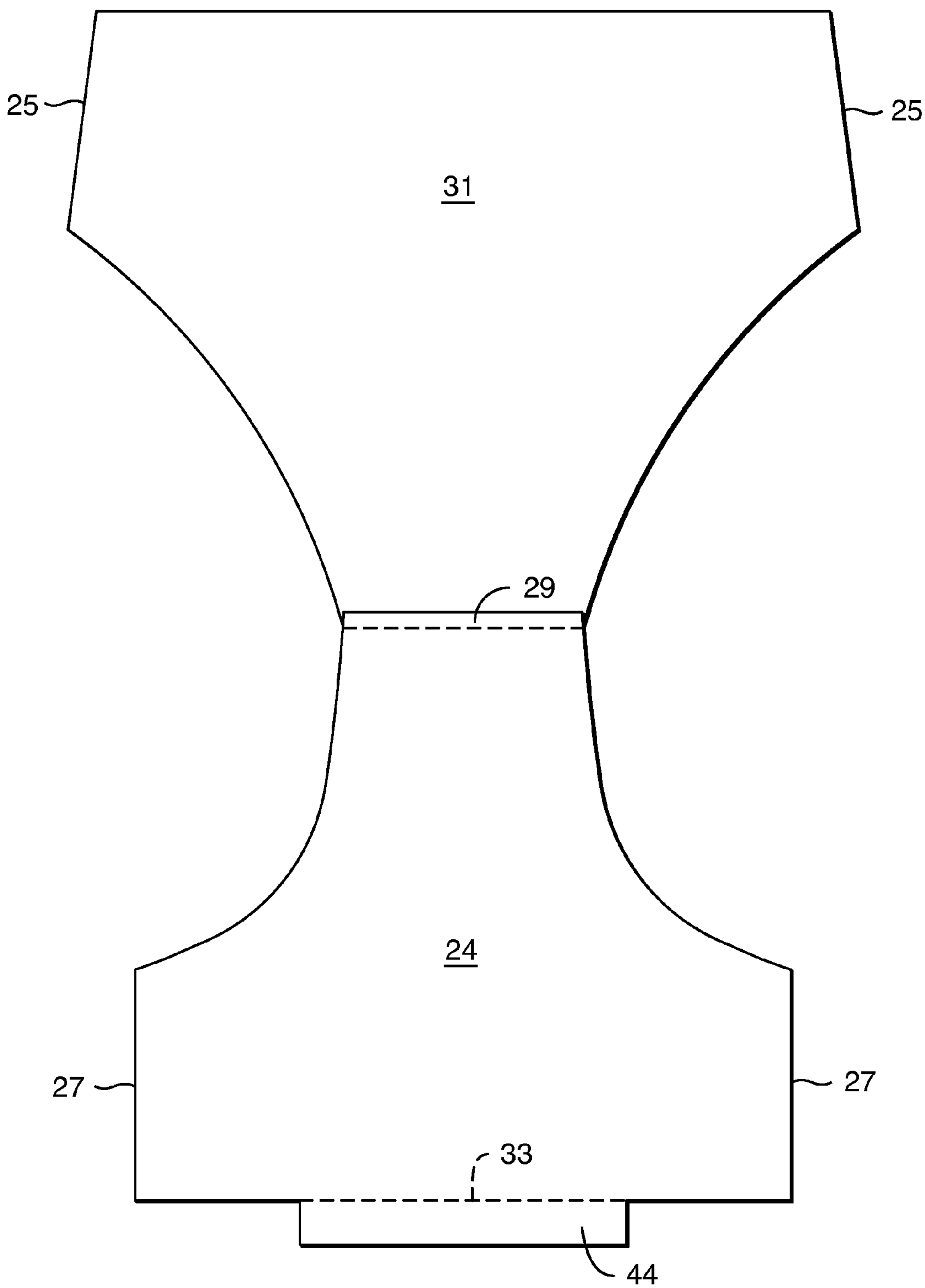

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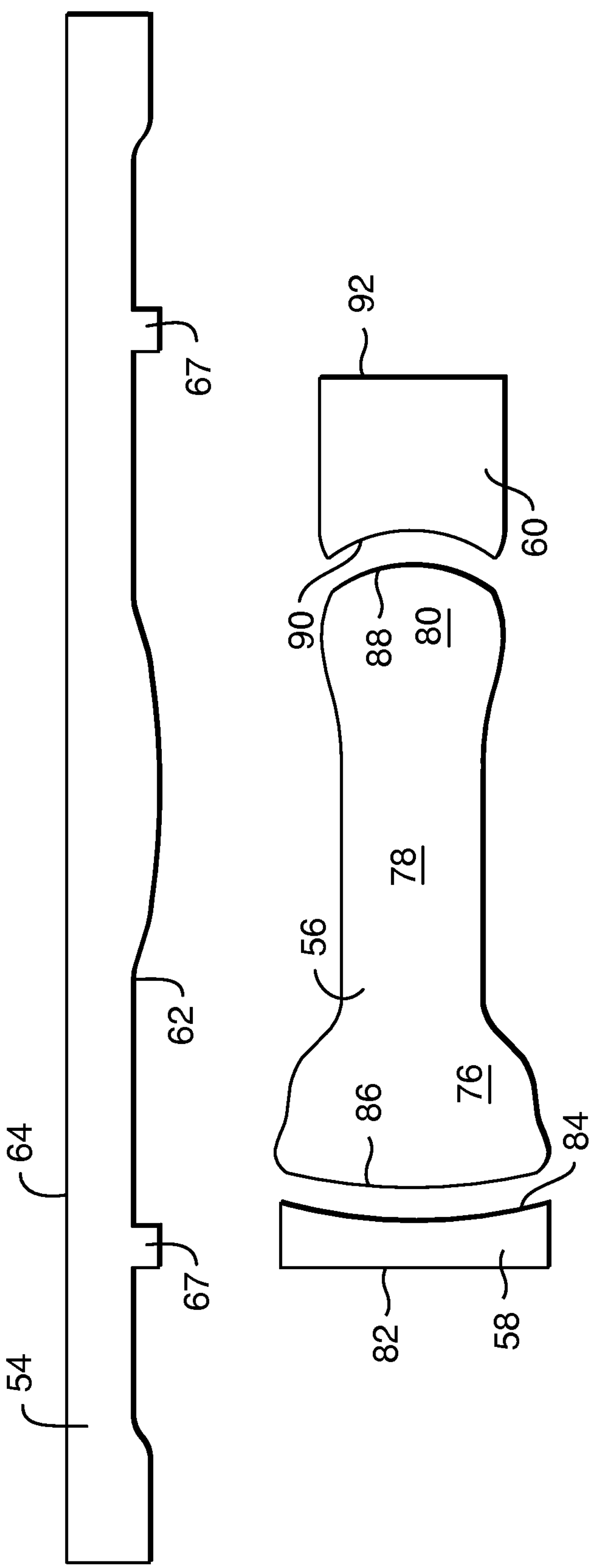

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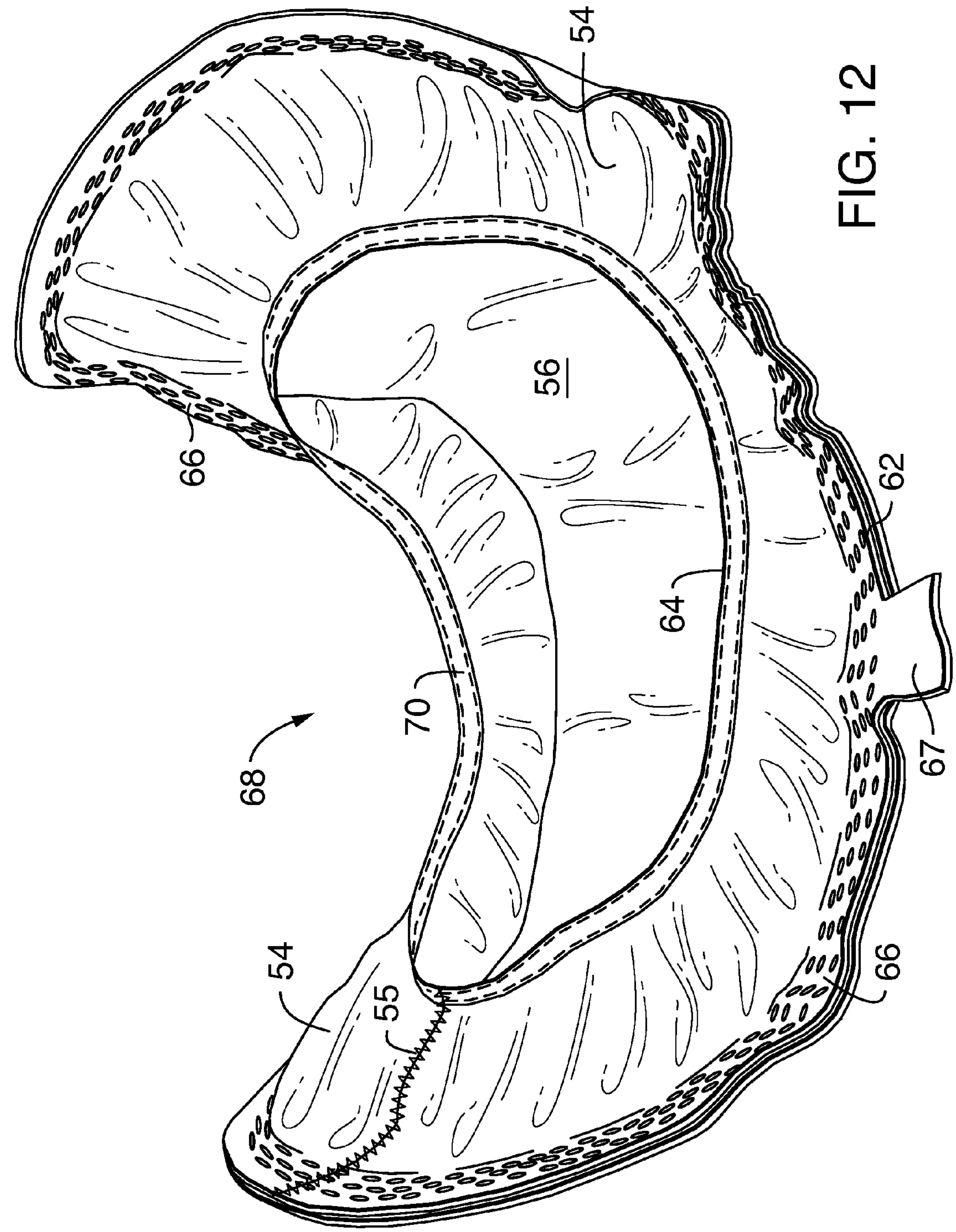

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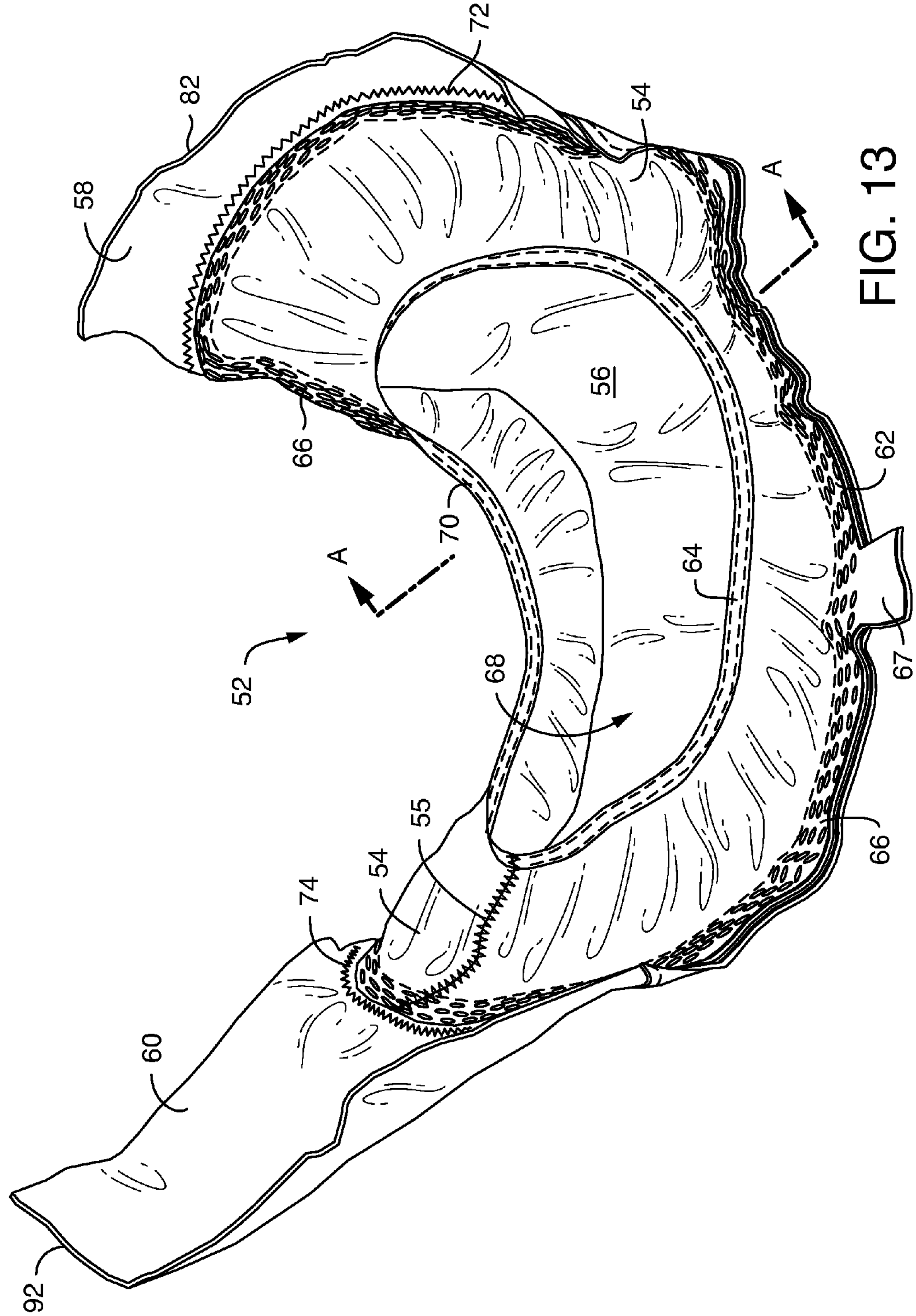

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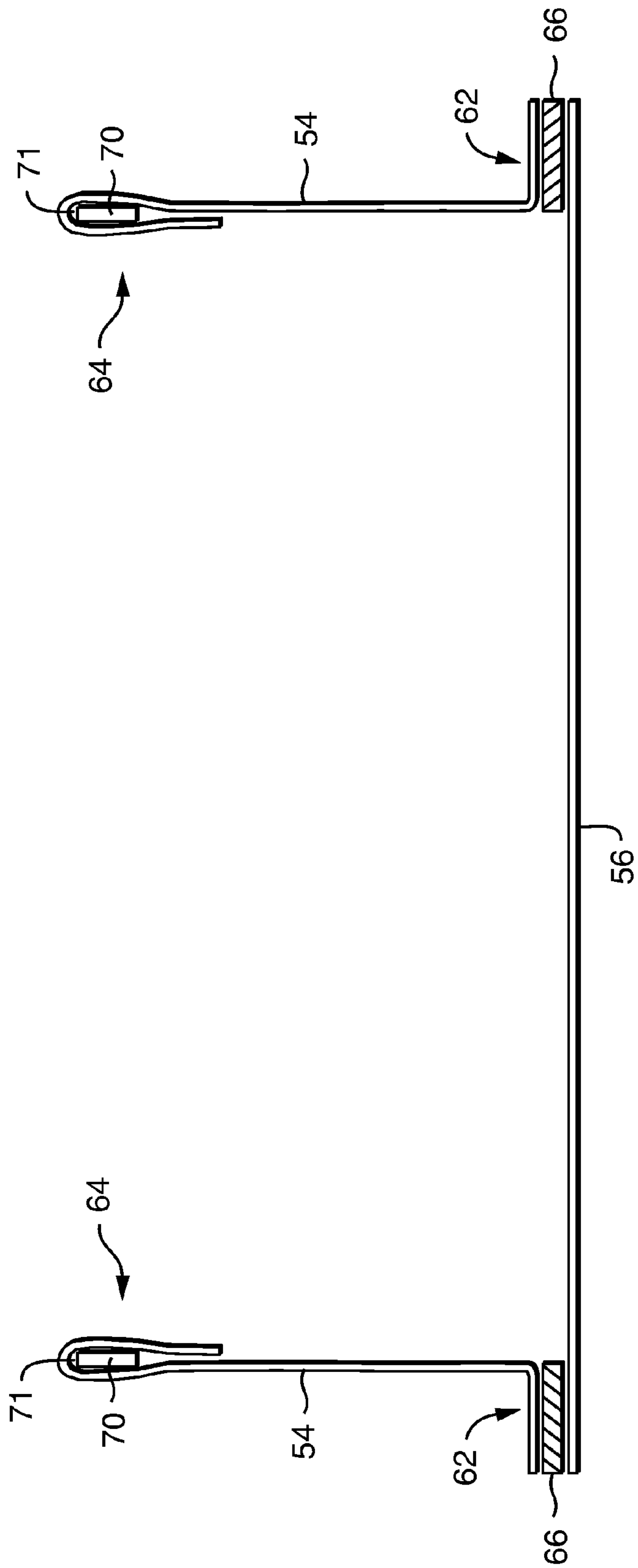

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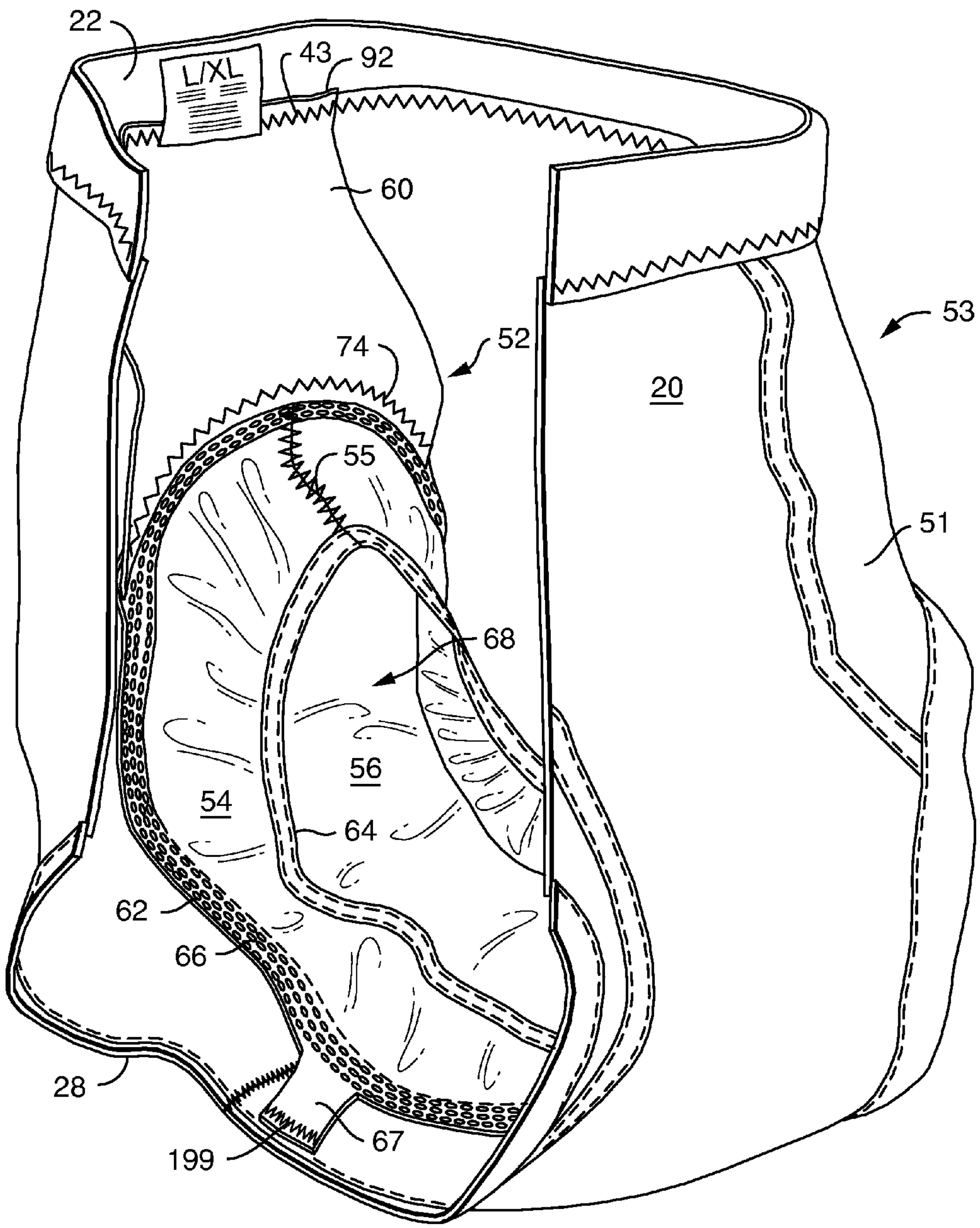

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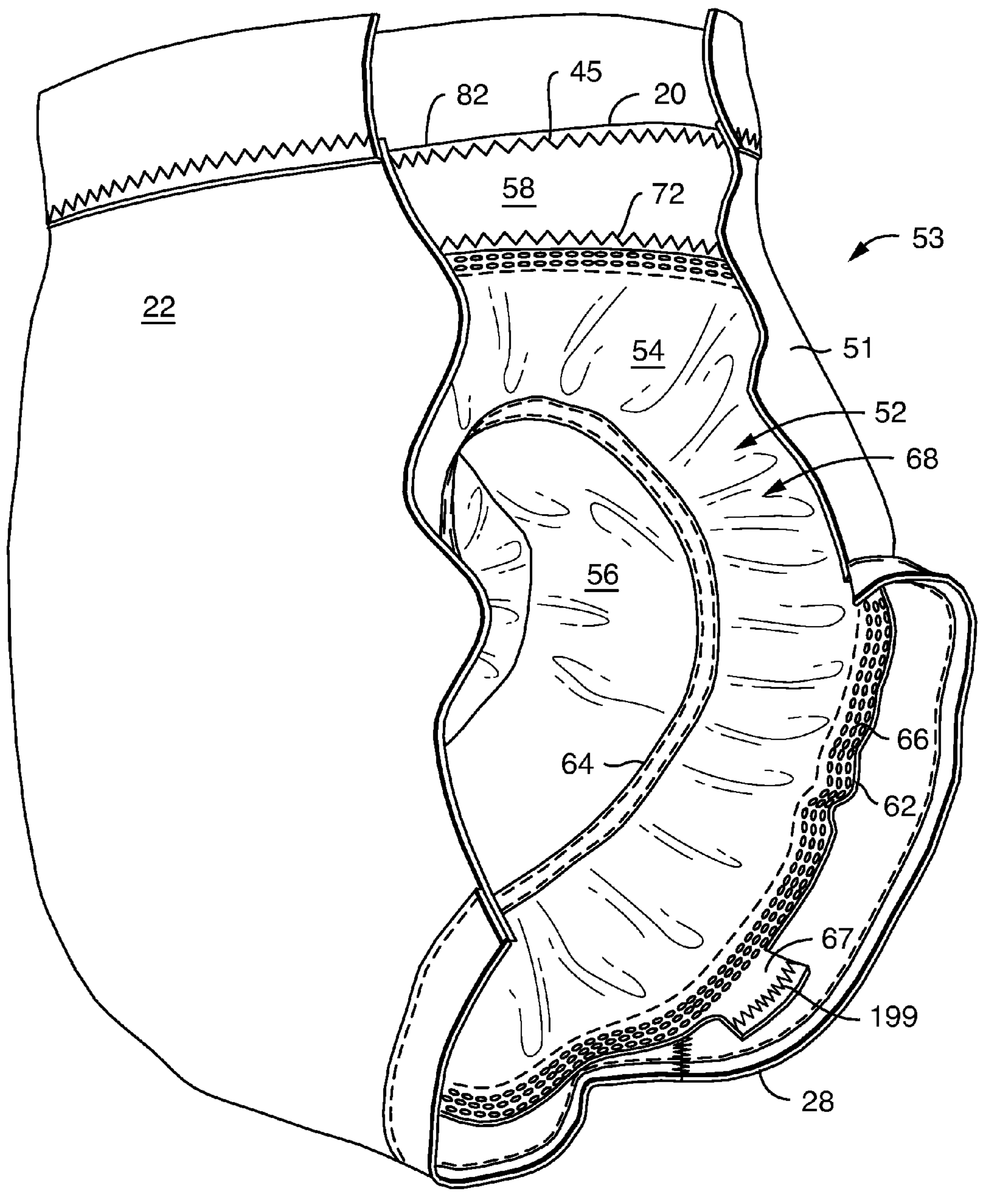

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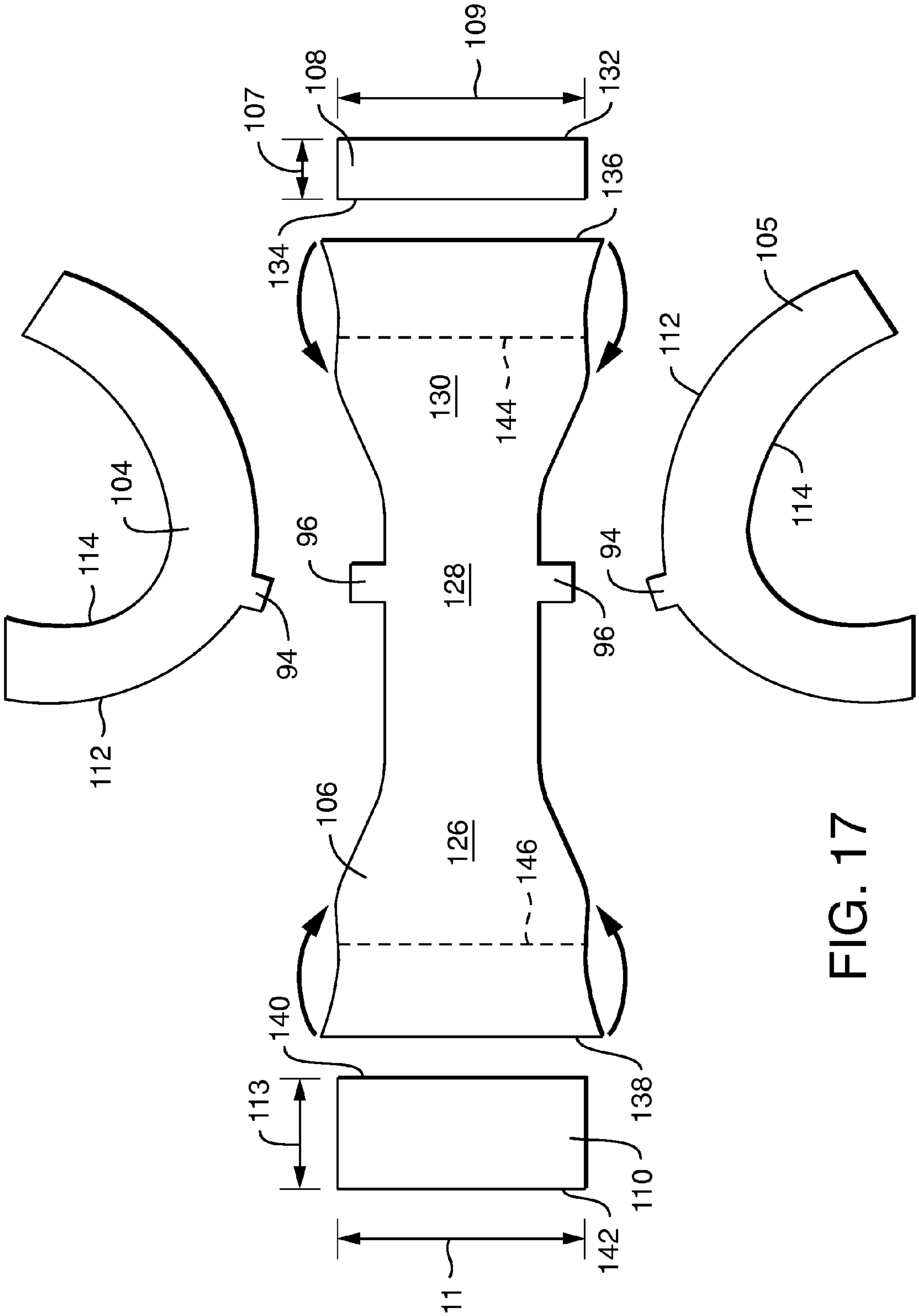
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FIG. 17

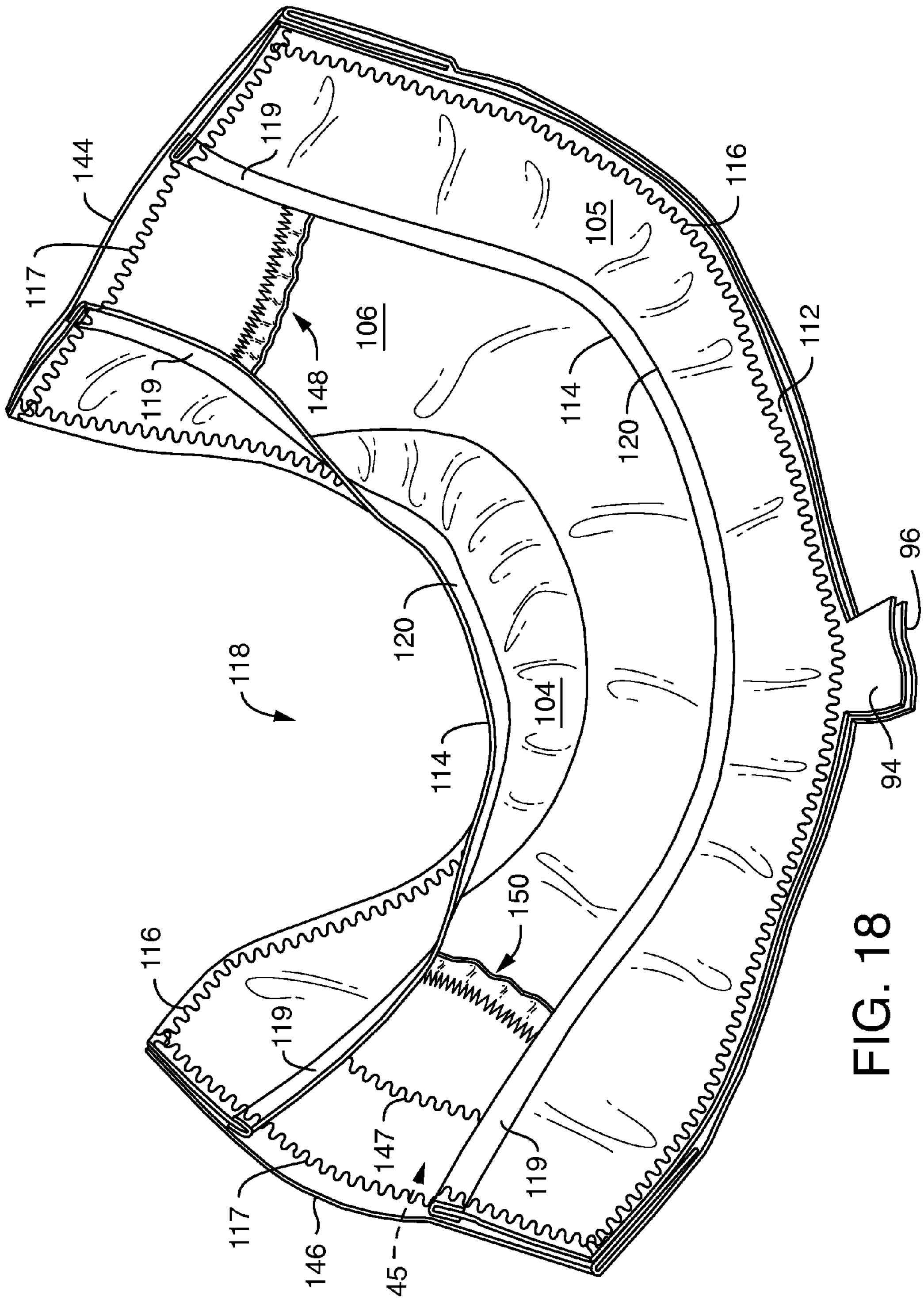
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FIG. 18

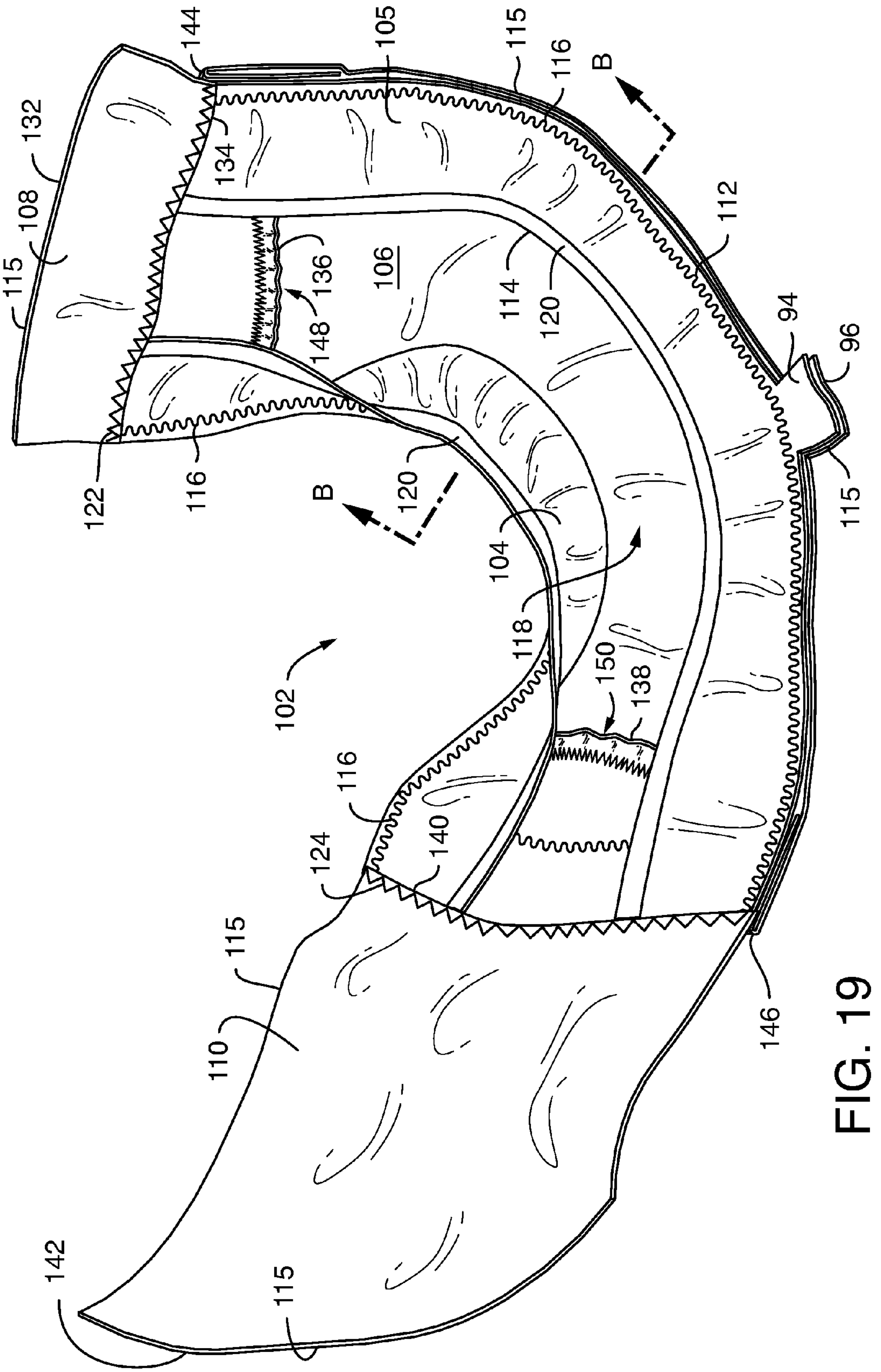
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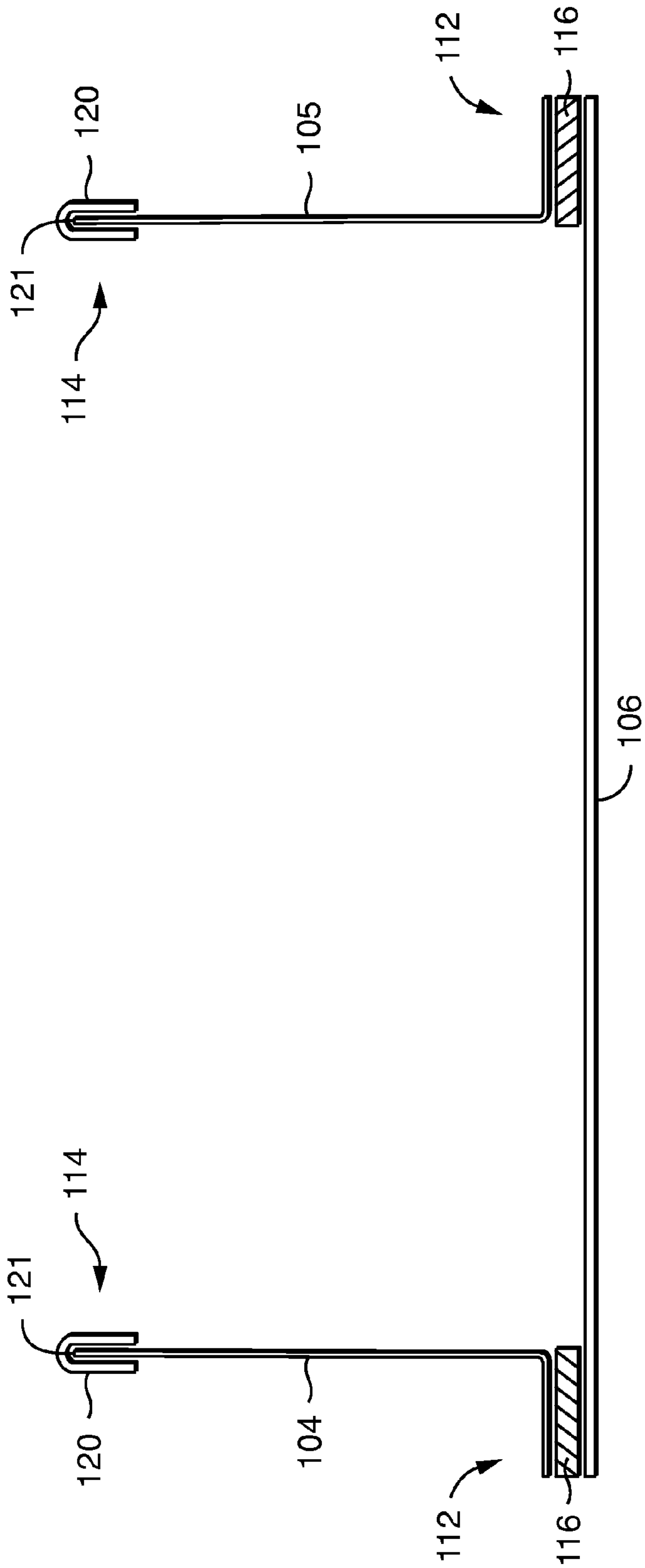
FIG. 19



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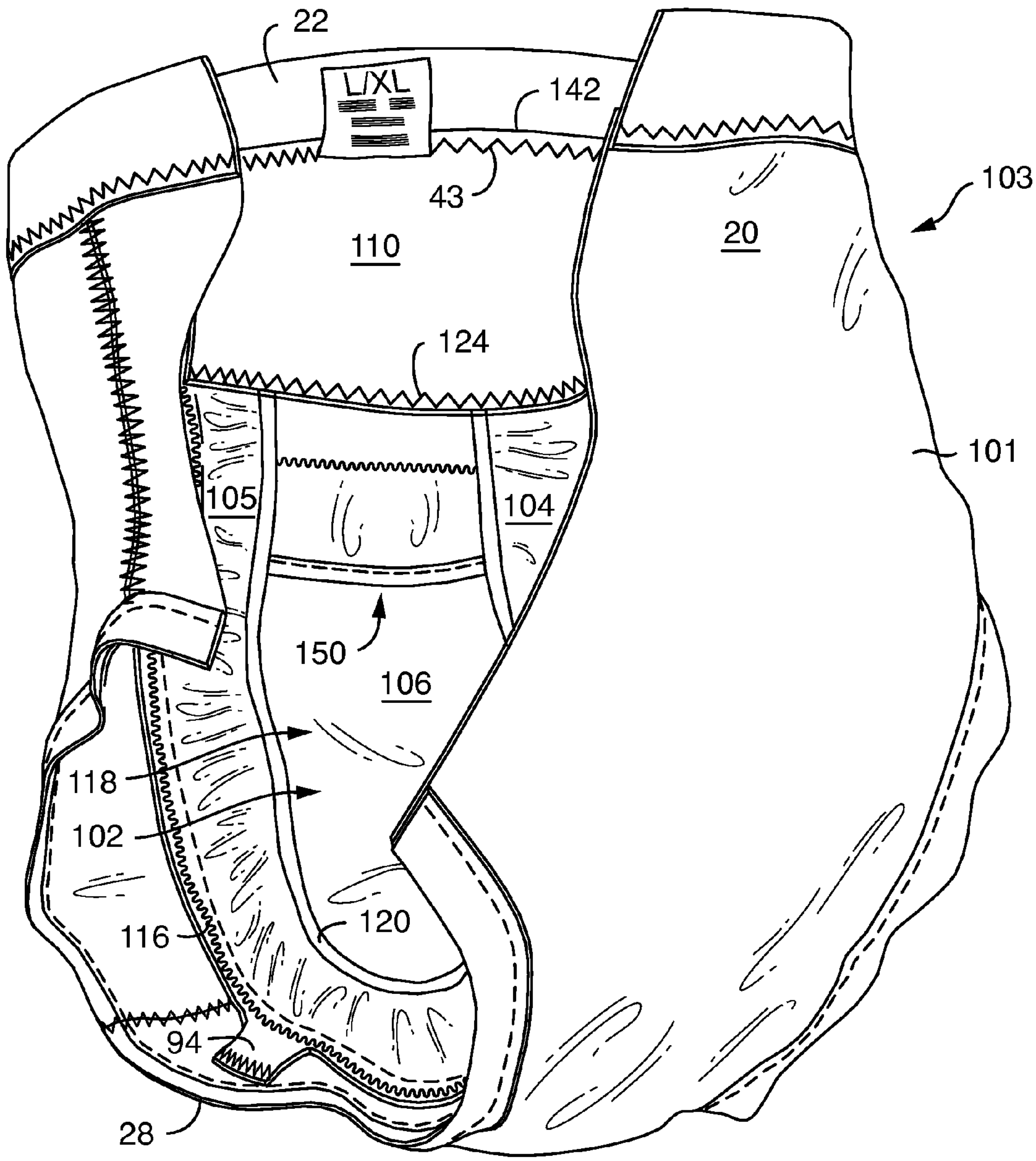
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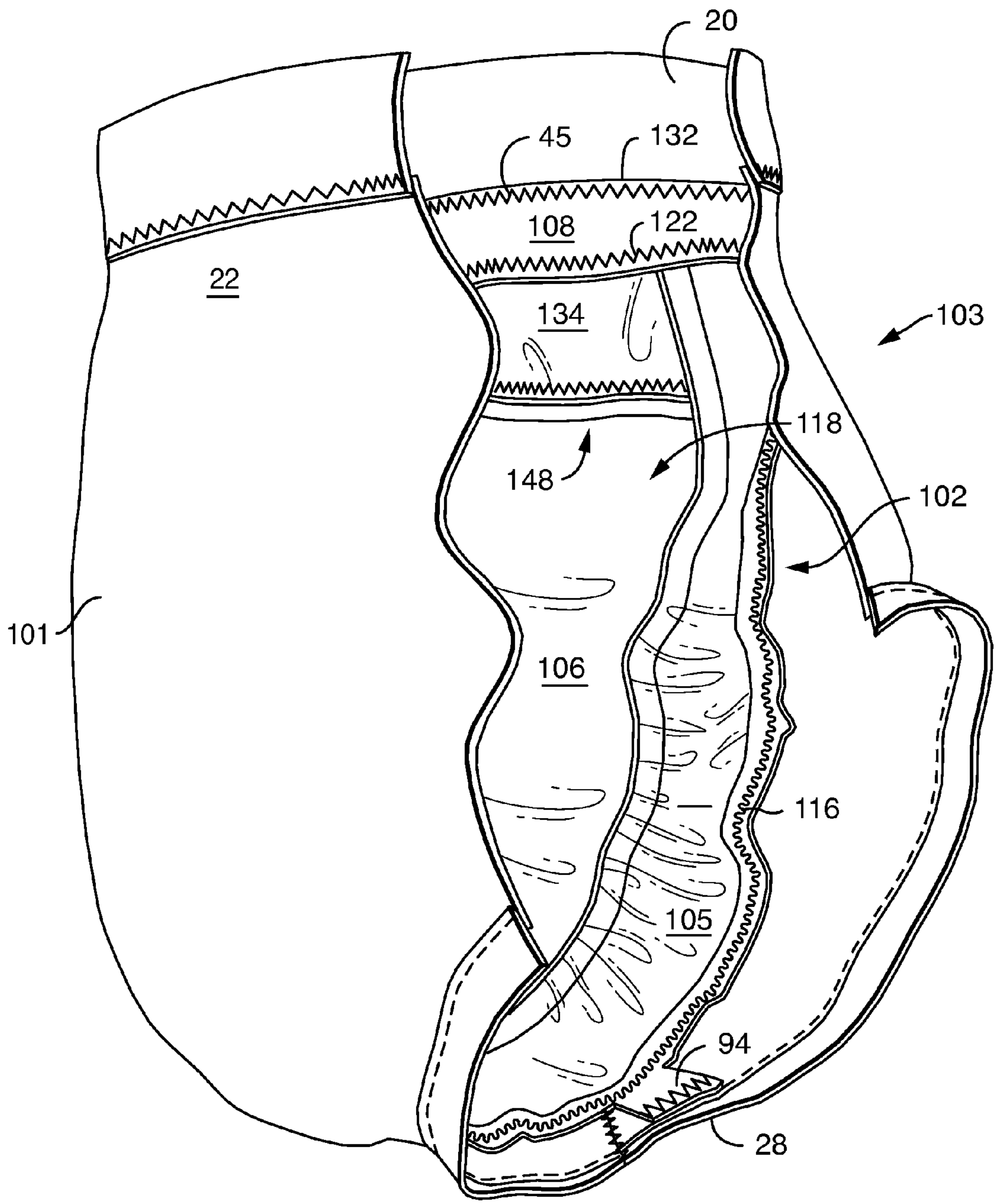
FIG. 21



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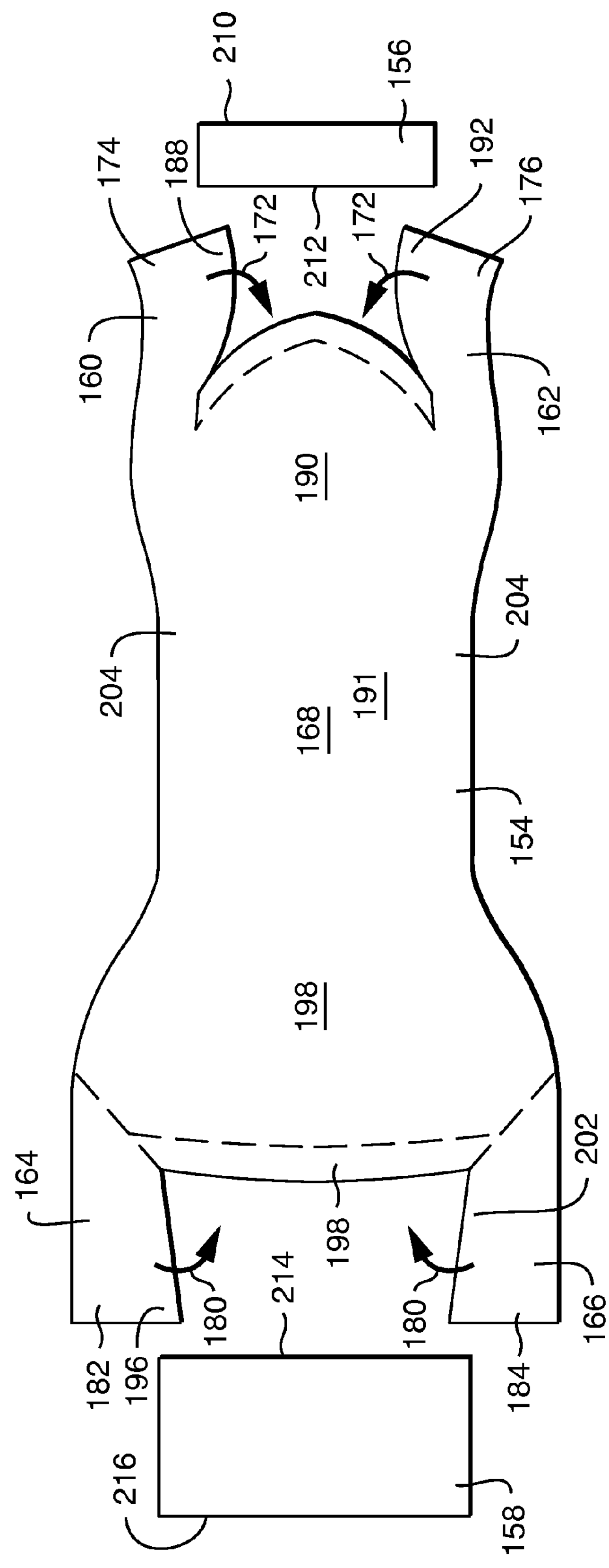
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FIG. 23

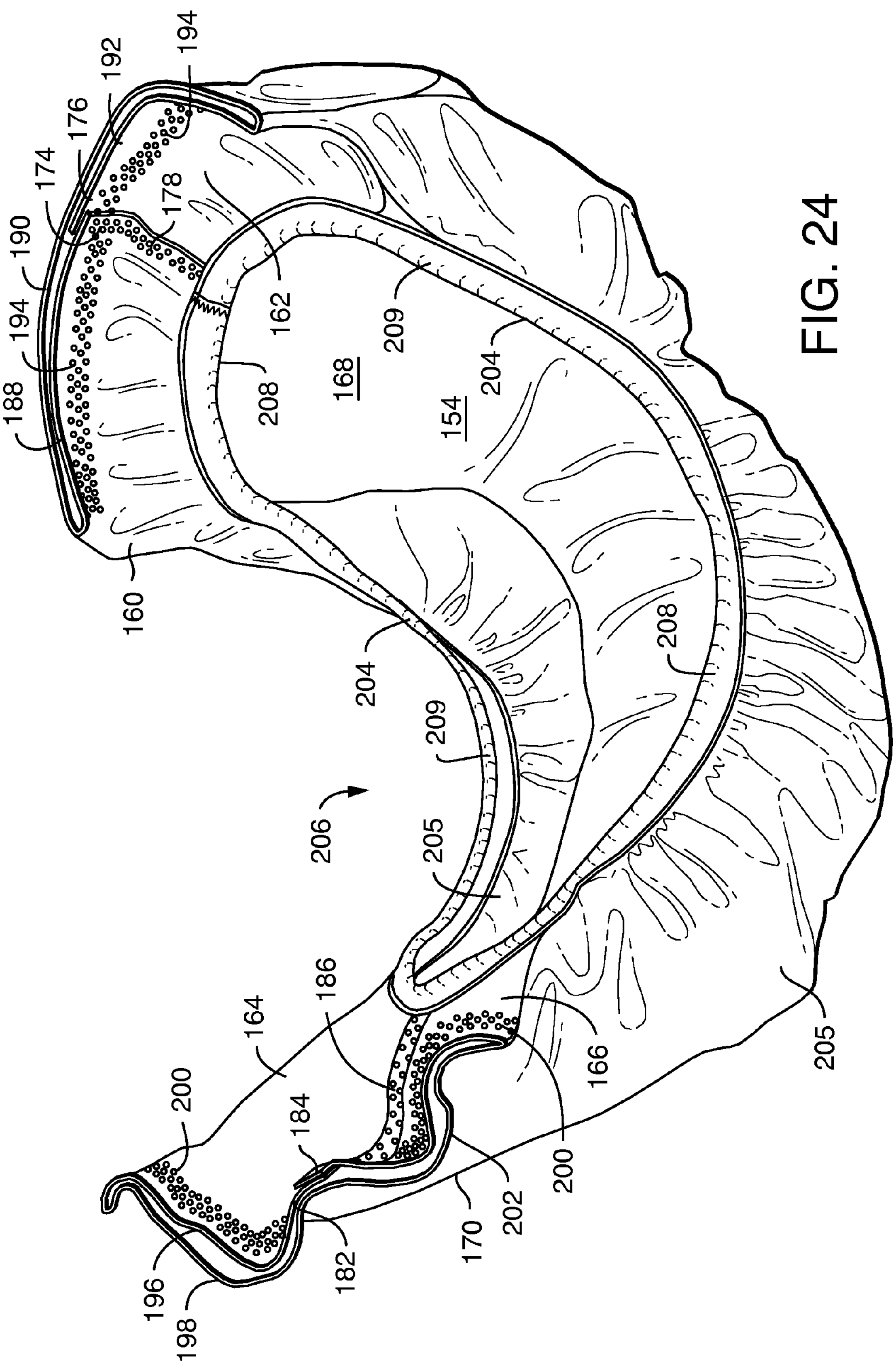
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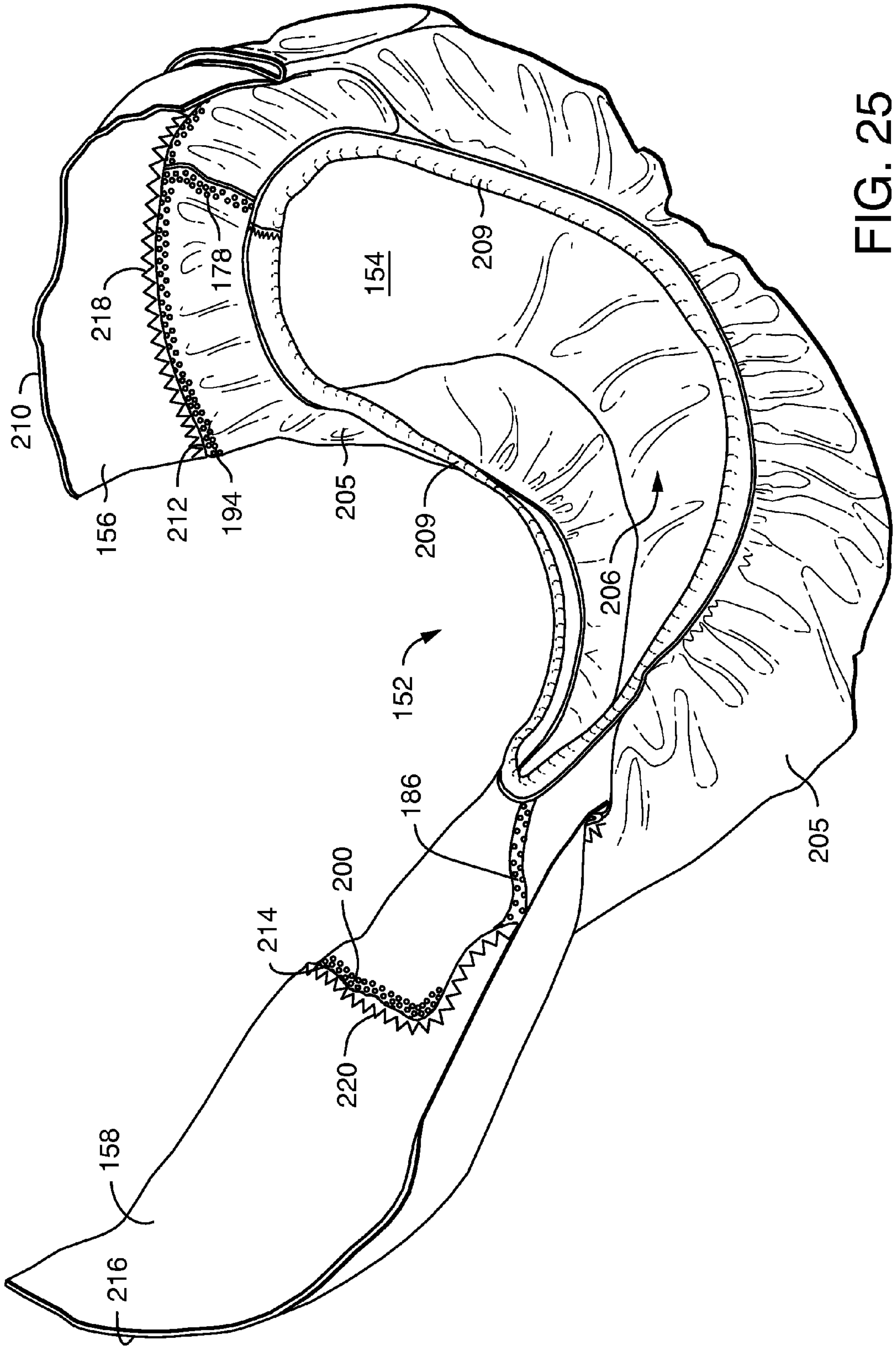
FIG. 24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212
194
205
209
206
152
186
205
200
214
220
158
216

FIG. 25

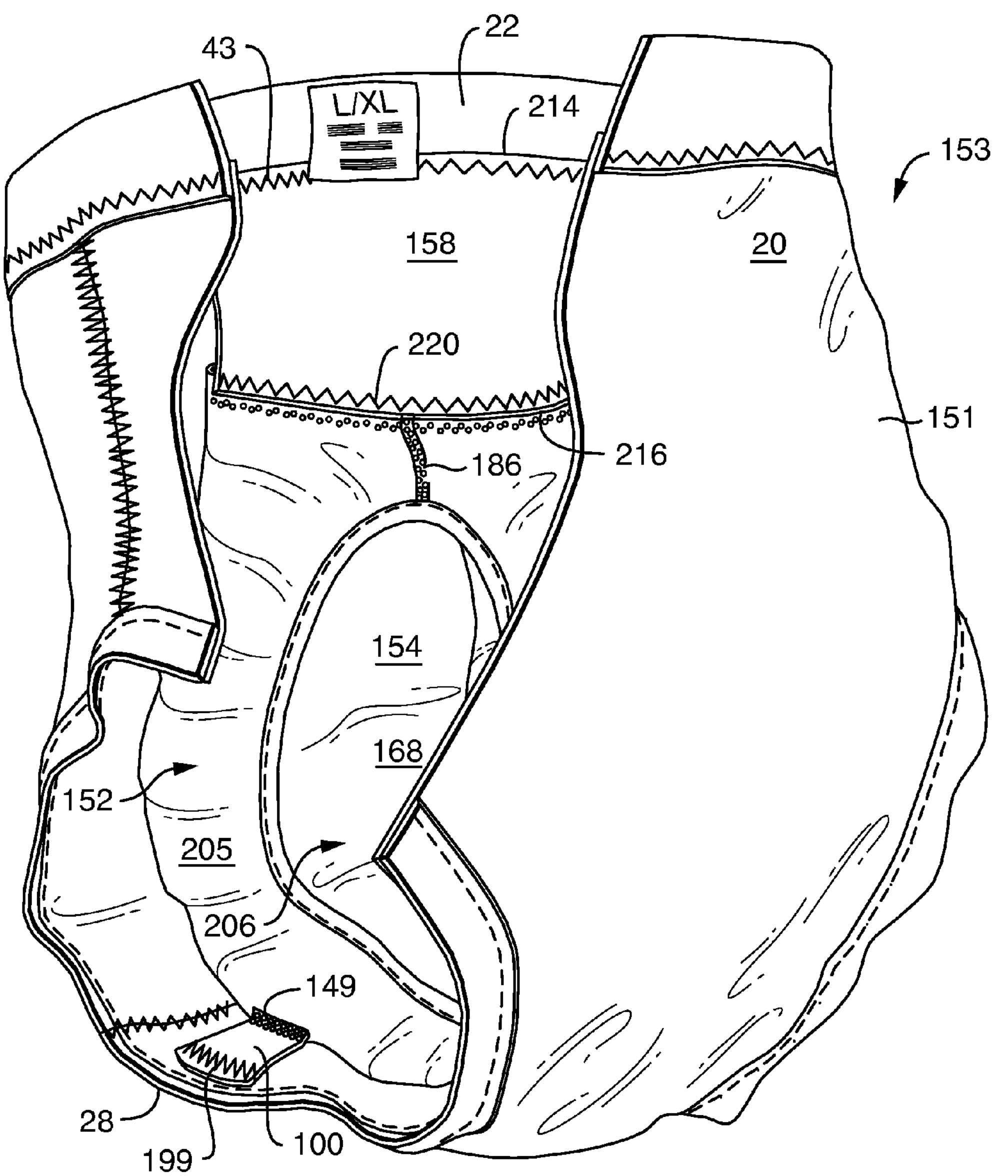
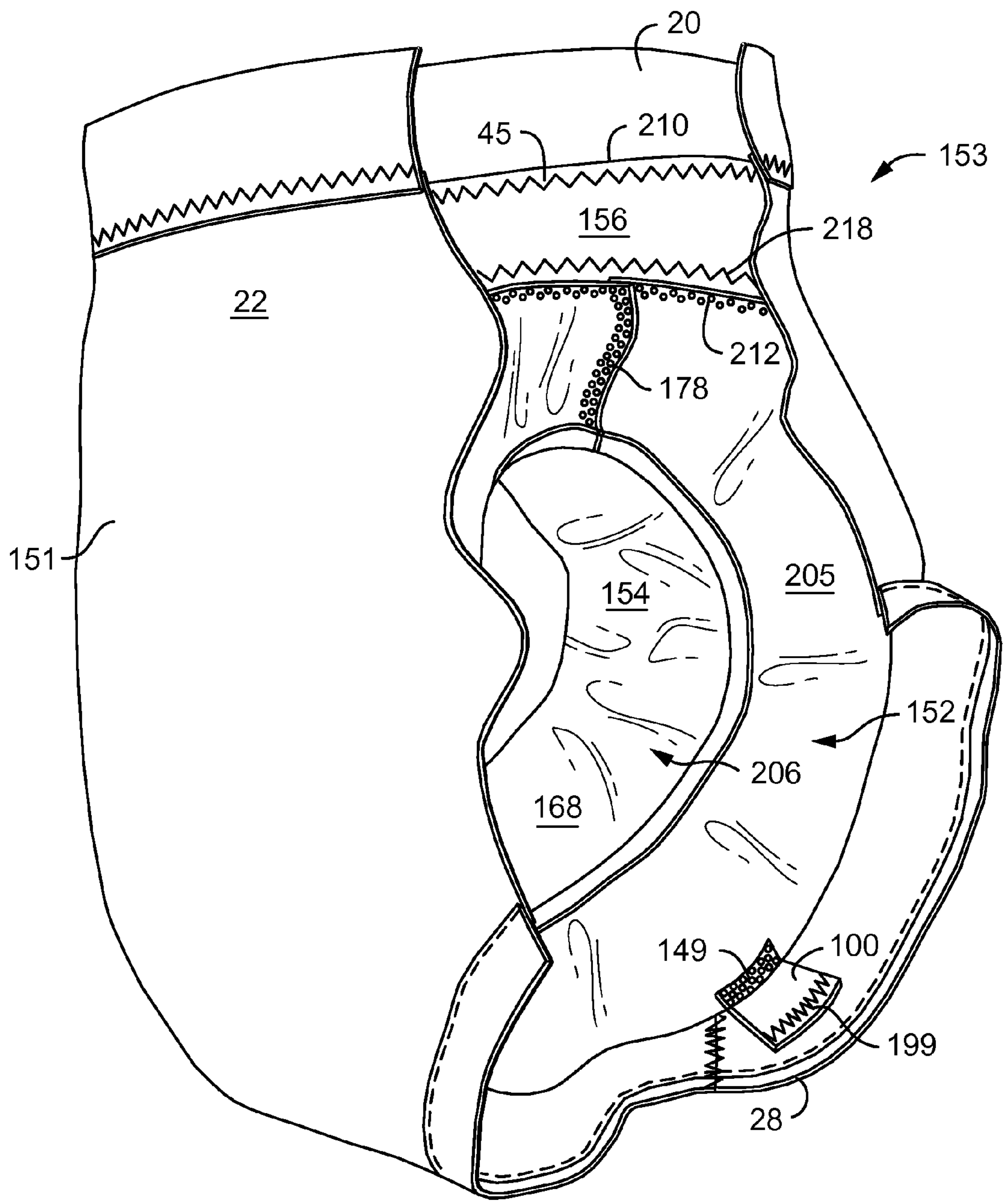

22
43
L/XL
214
153
158
20
220
151
216
186
154
168
152
205
206
149
28
199
100

FIG. 26


20
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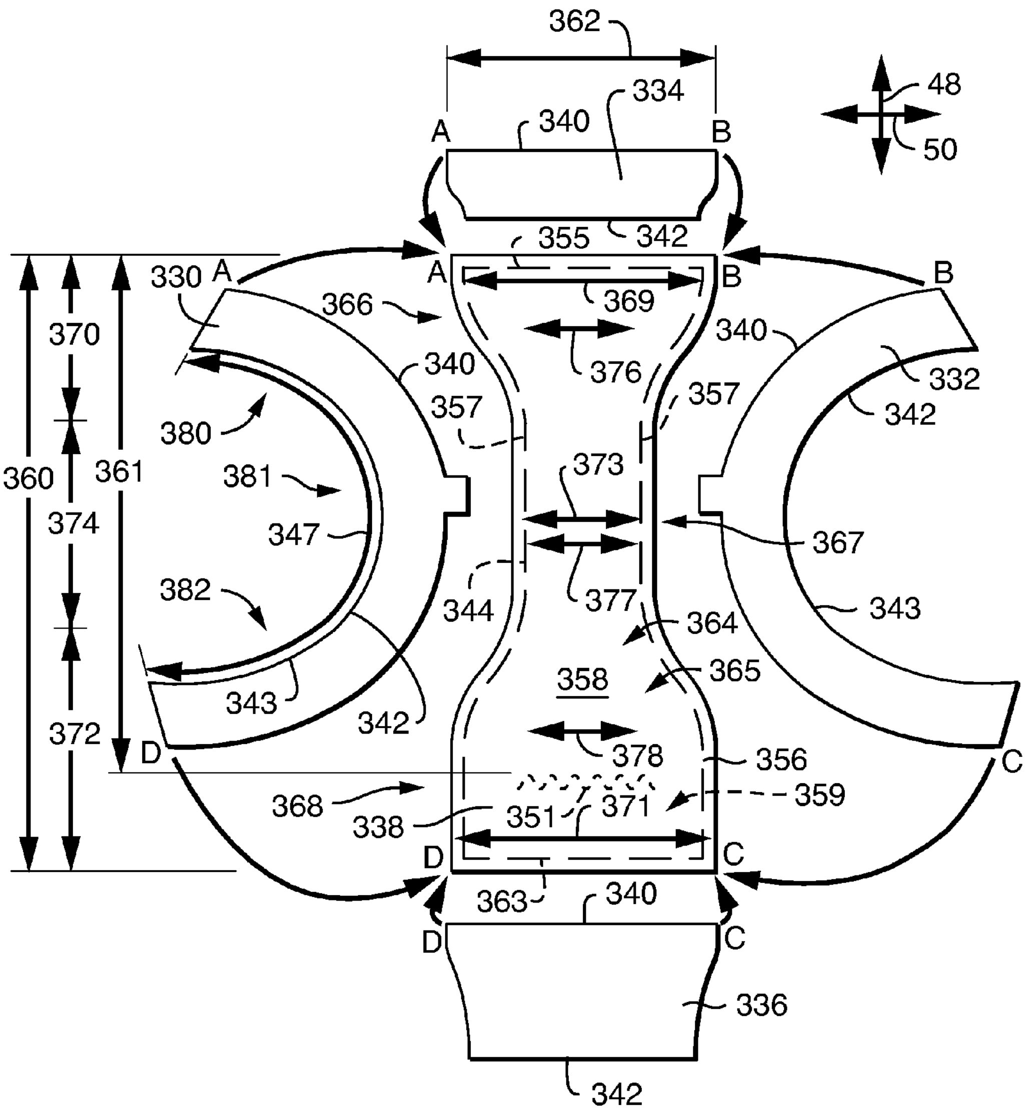
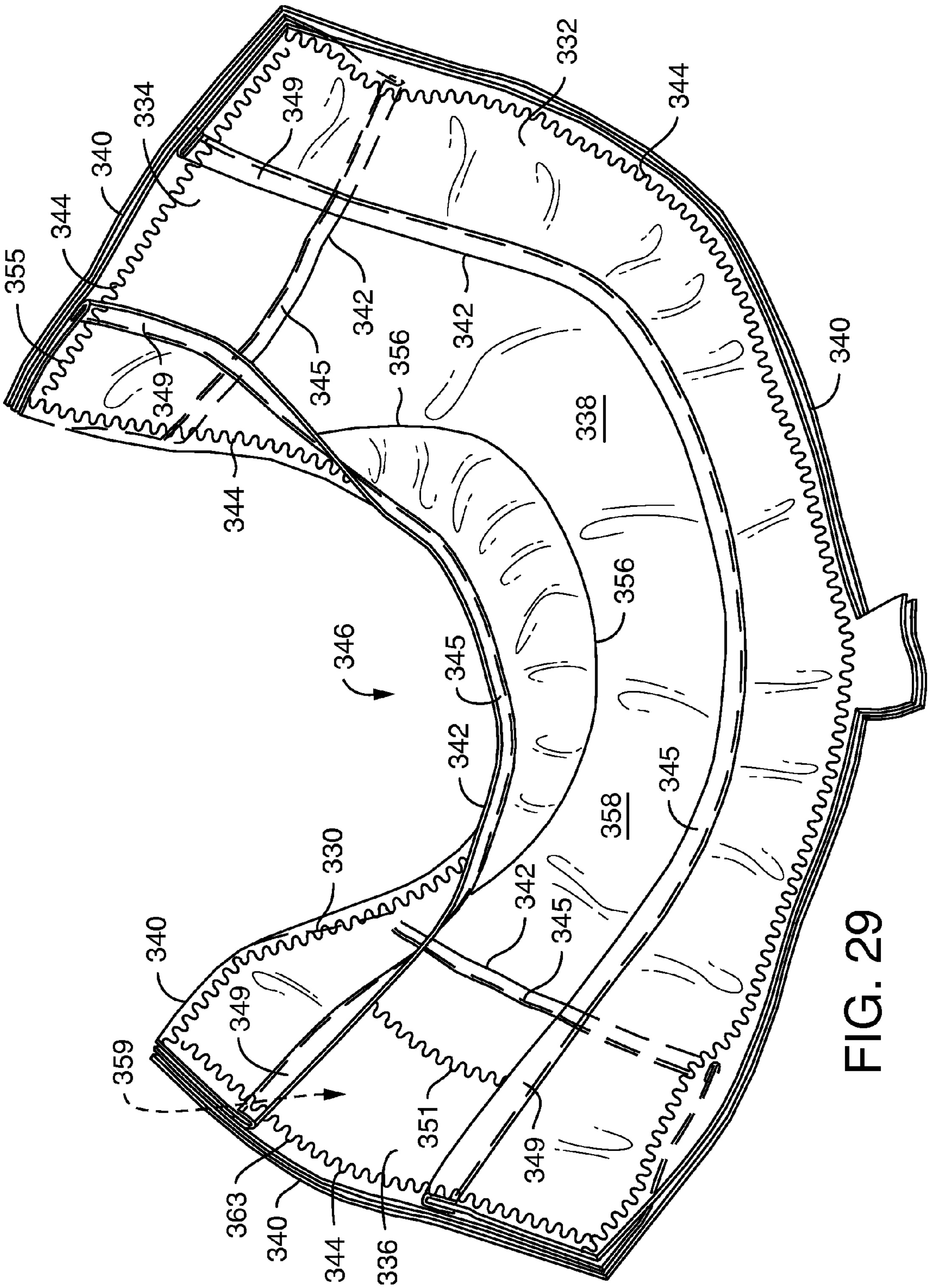
210
153
156
218
22
212
178
151
205
154
152
206
168
149
100
199
28

FIG. 27



362
48
50
340
334
A
B
342
355
369
330
366
376
340
332
370
380
357
381
347
373
374
367
360
361
382
344
377
364
365
358
343
372
378
356
D
C
368
351
371
359
338
363
336

FIG. 28



330
332
334
336
338
340
342
344
345
346
349
351
355
356
358
359
363

FIG. 29

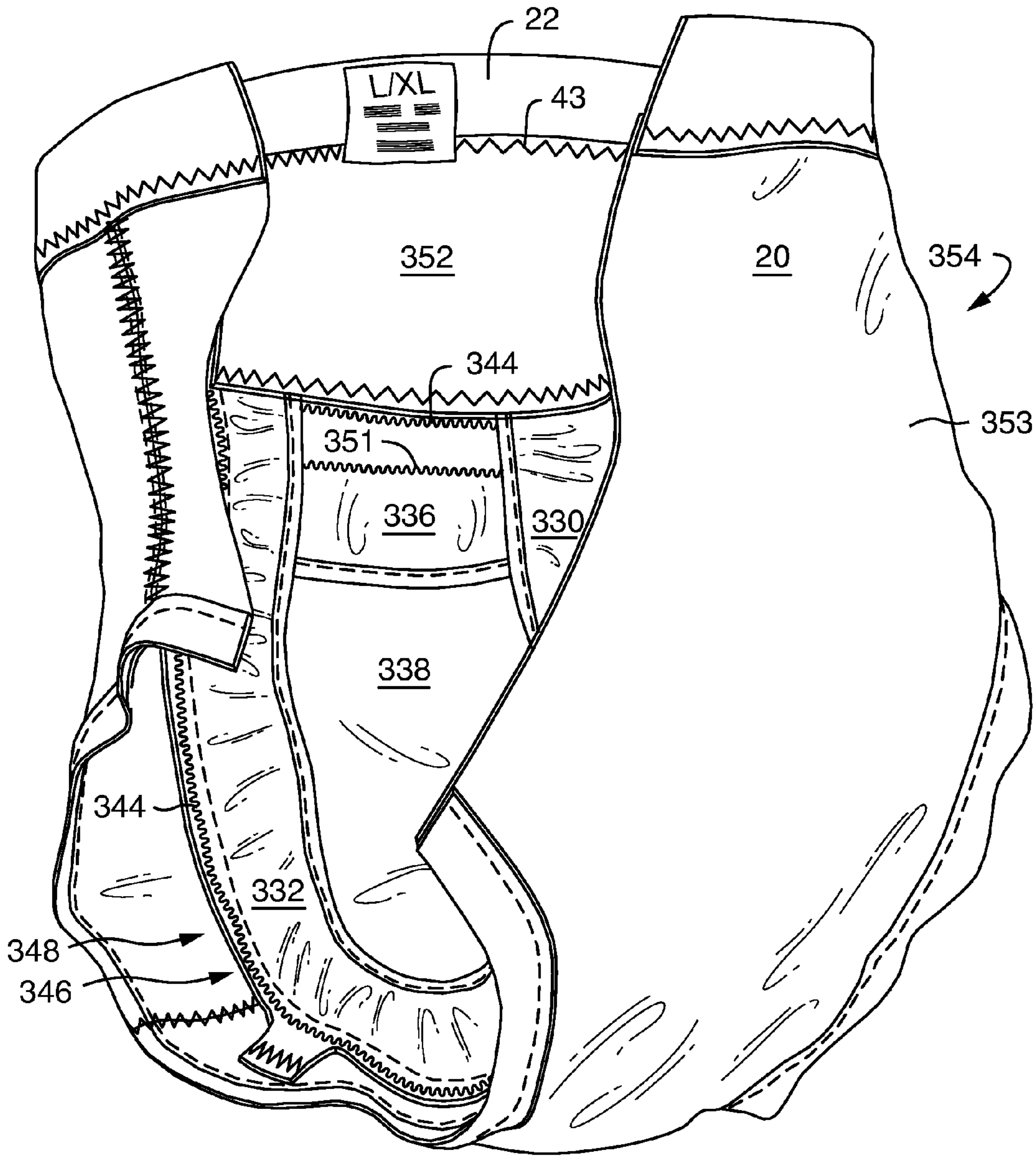


FIG. 30

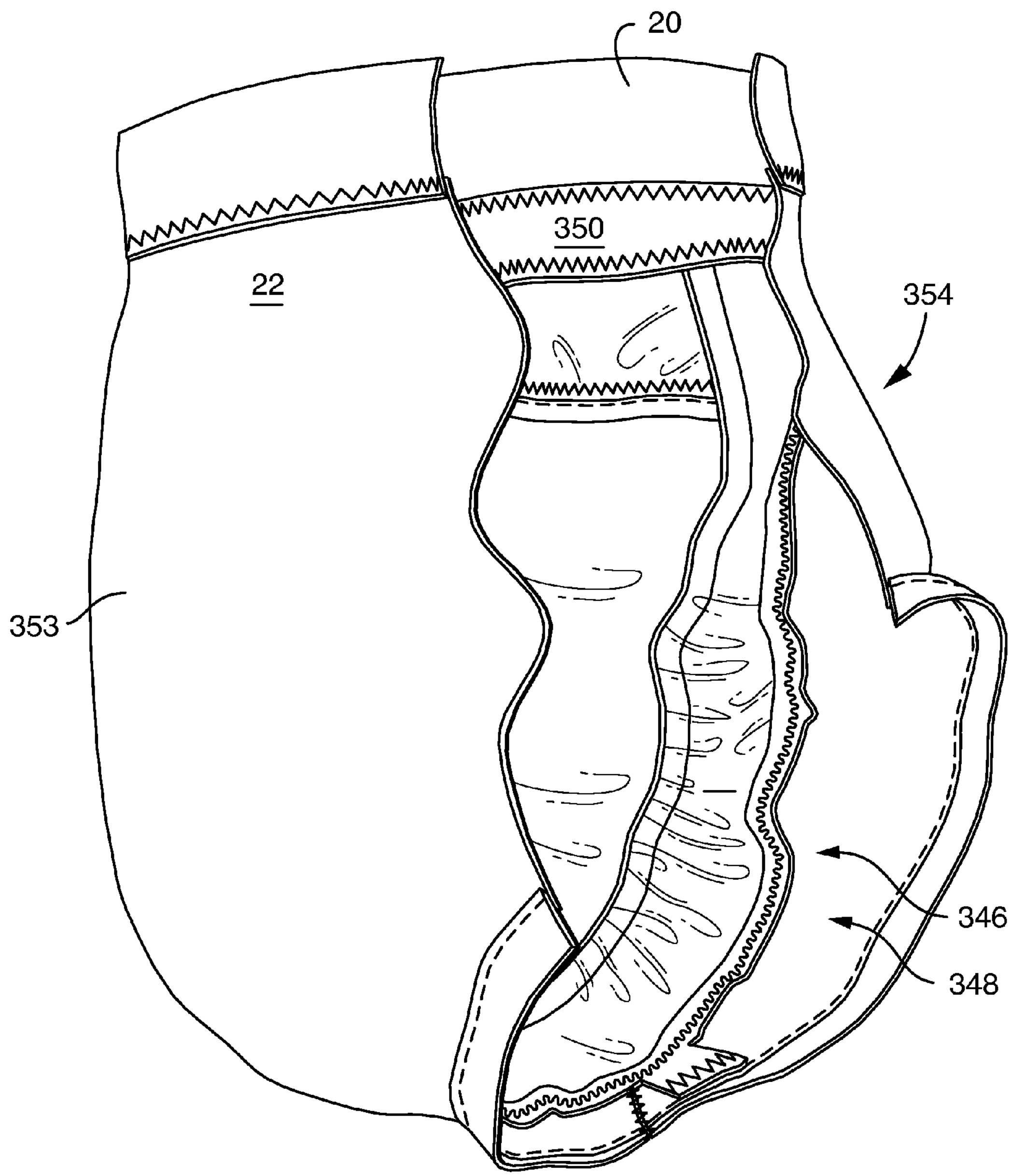


FIG. 31

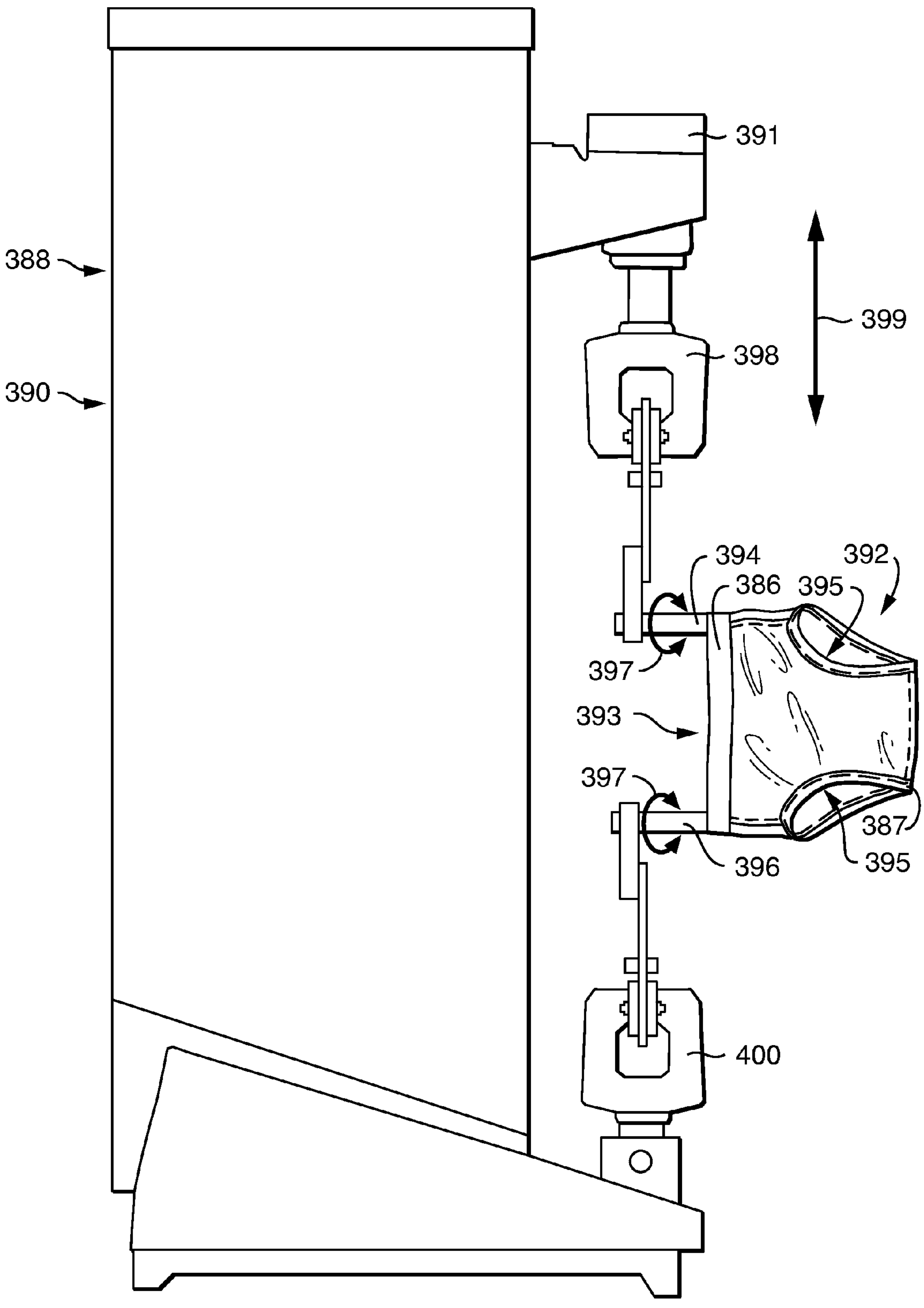


FIG. 32

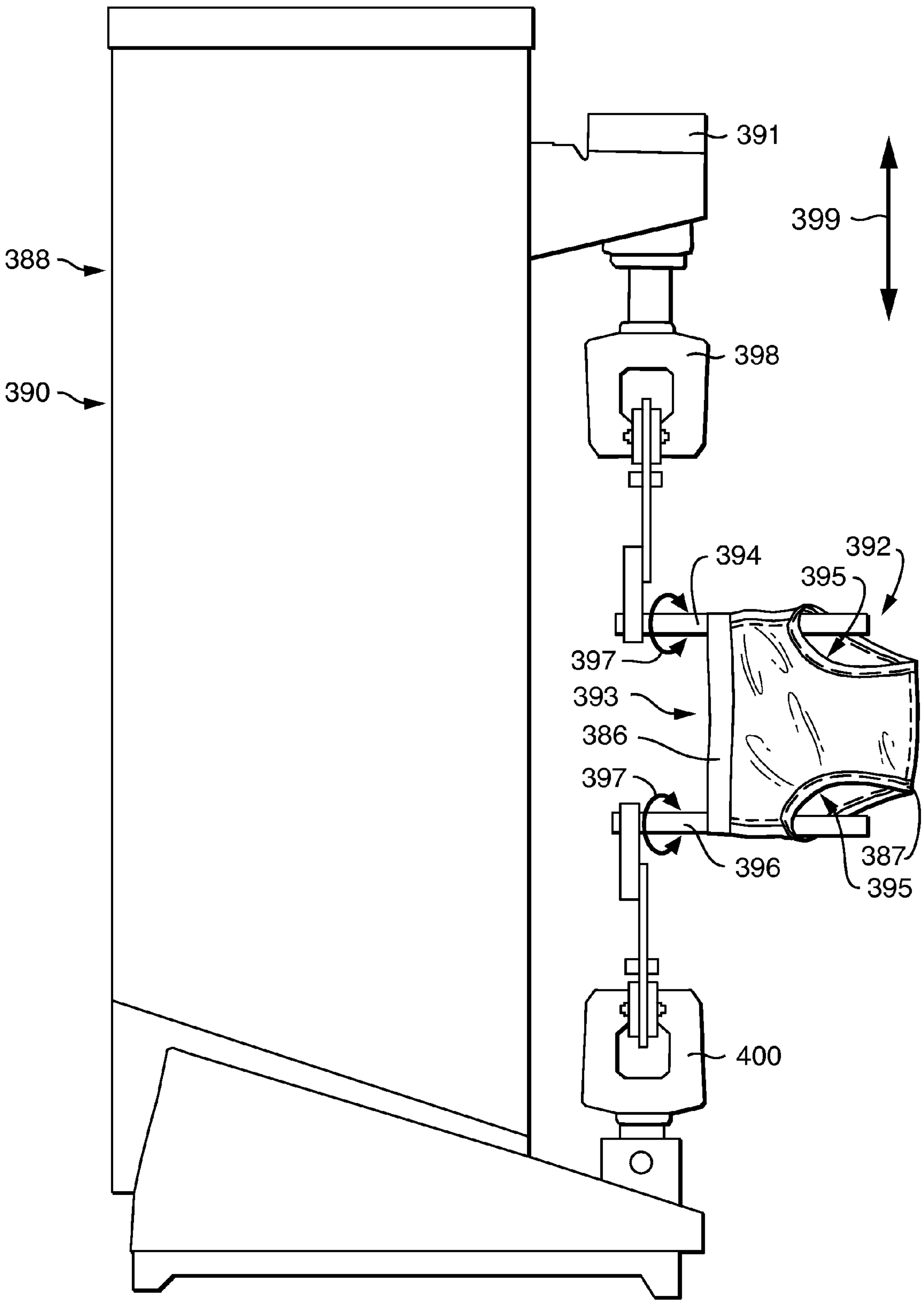


FIG. 33

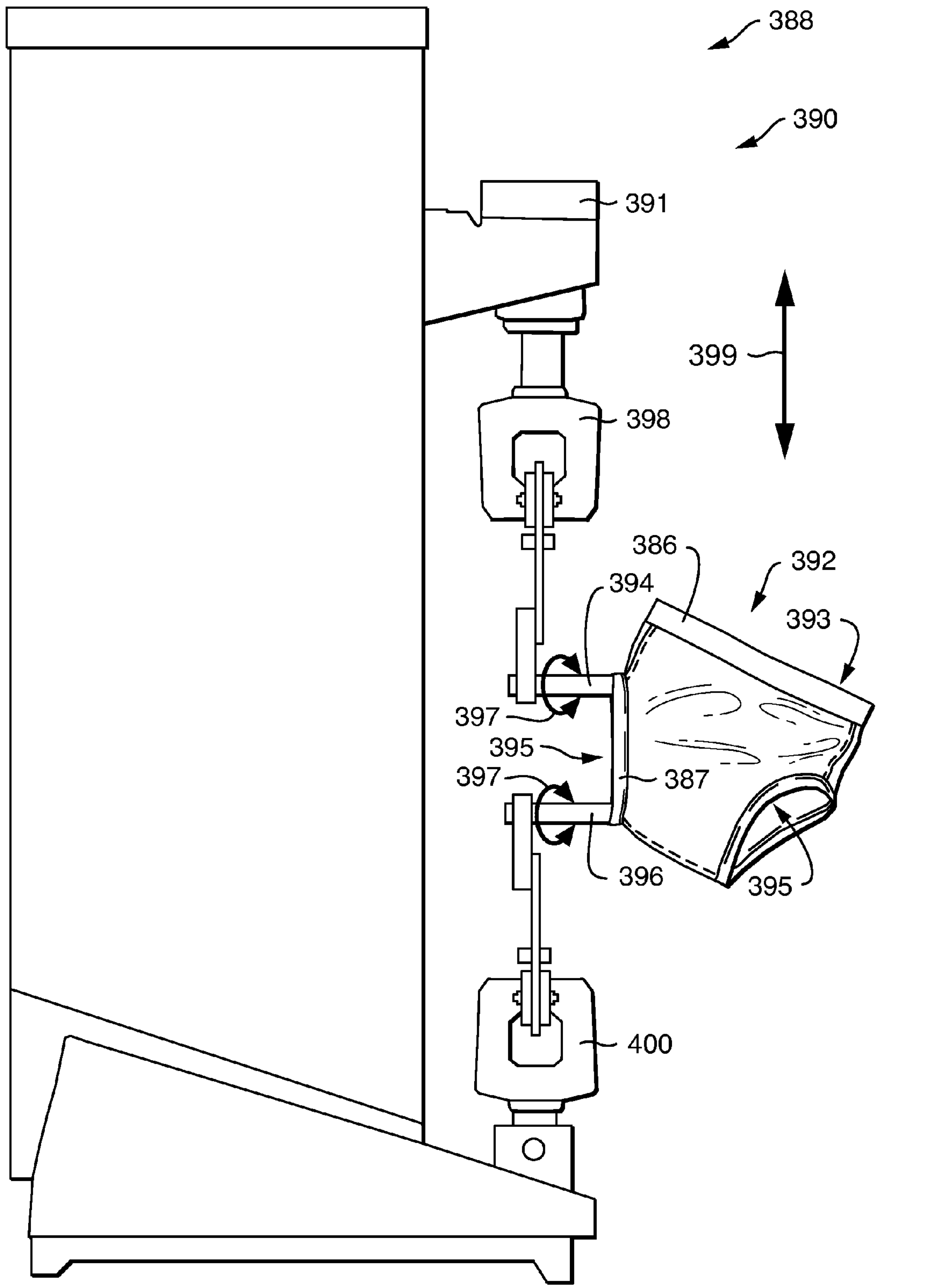


FIG. 34

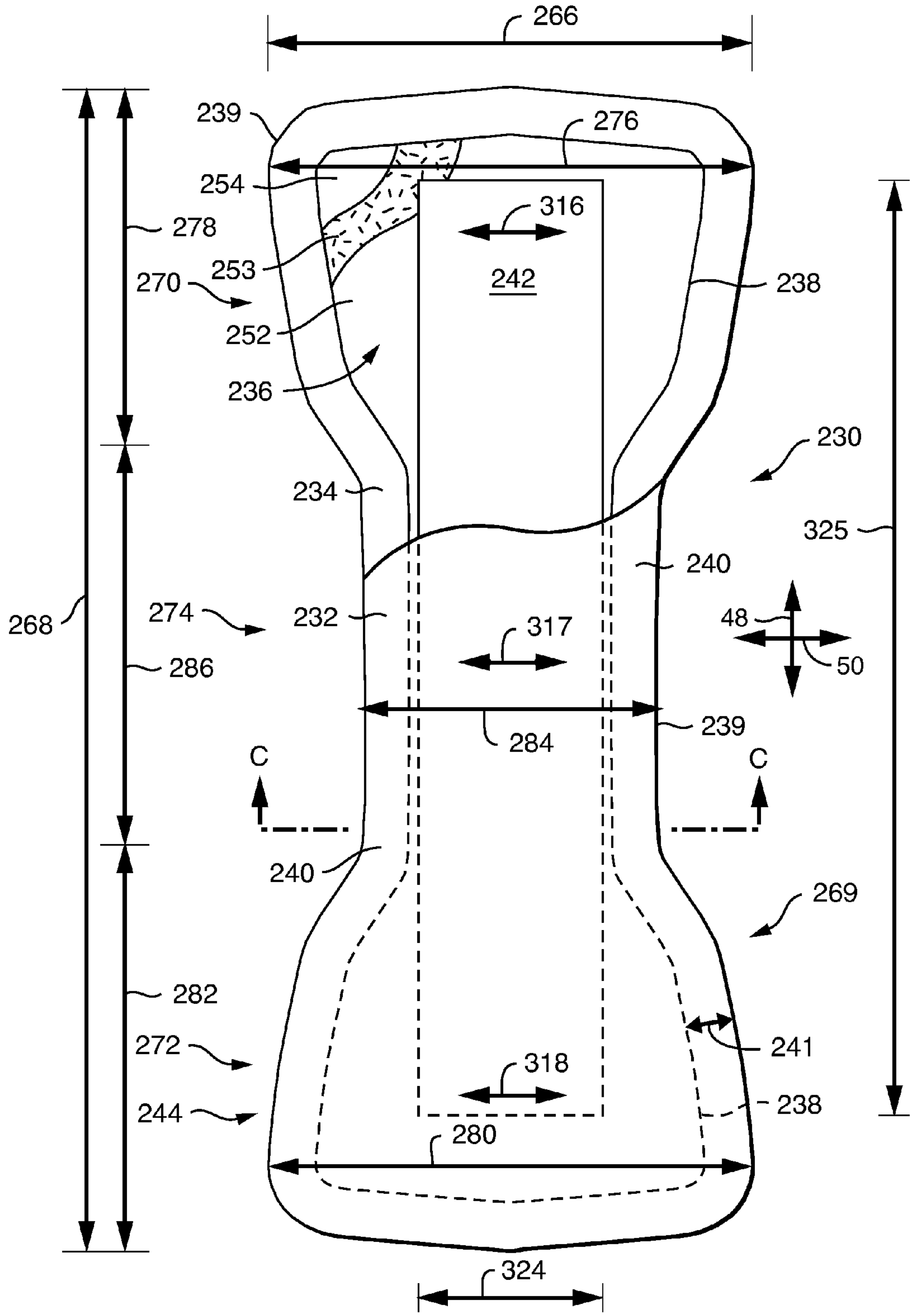

266
239
276
254
316
278
253
242
238
270
252
236
230
234
325
240
274
232
48
268
317
286
50
284
239
C
C
240
269
282
241
272
318
238
244
280
324

FIG. 35

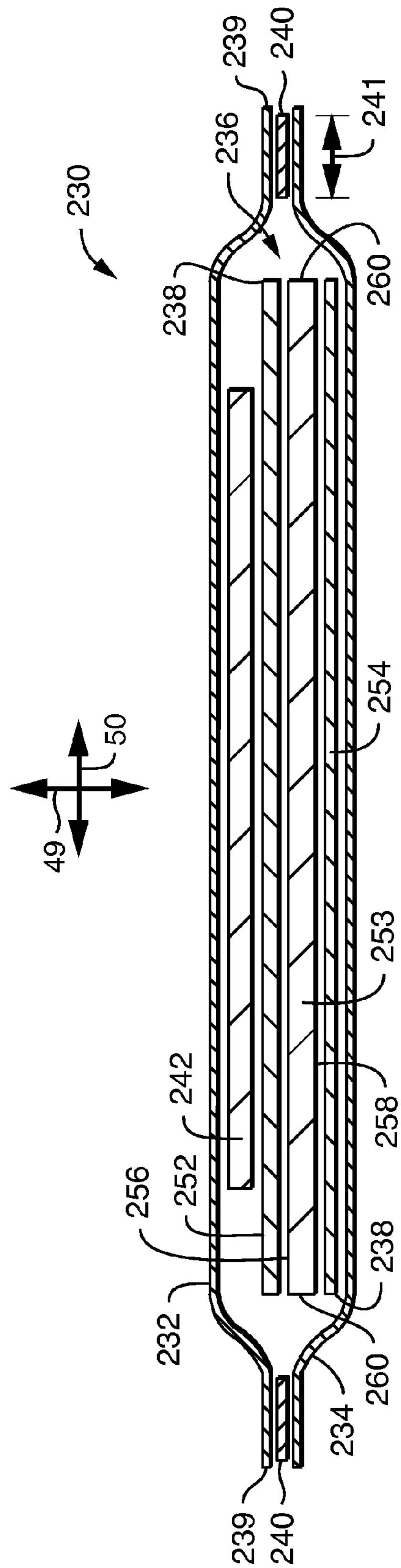


FIG. 36

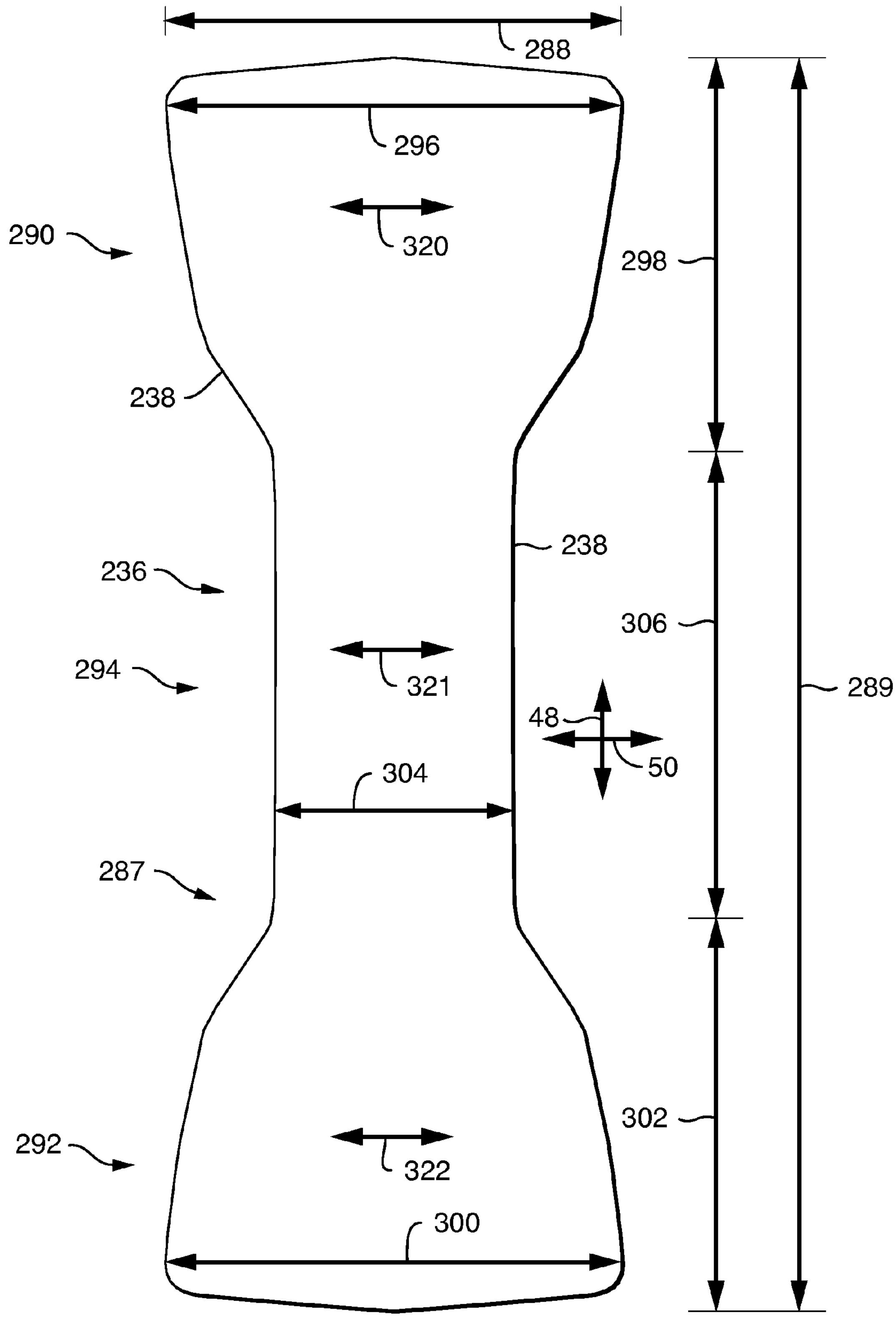

288
296
320
290
298
238
238
236
306
294
321
289
48
50
304
287
302
292
322
300

FIG. 37

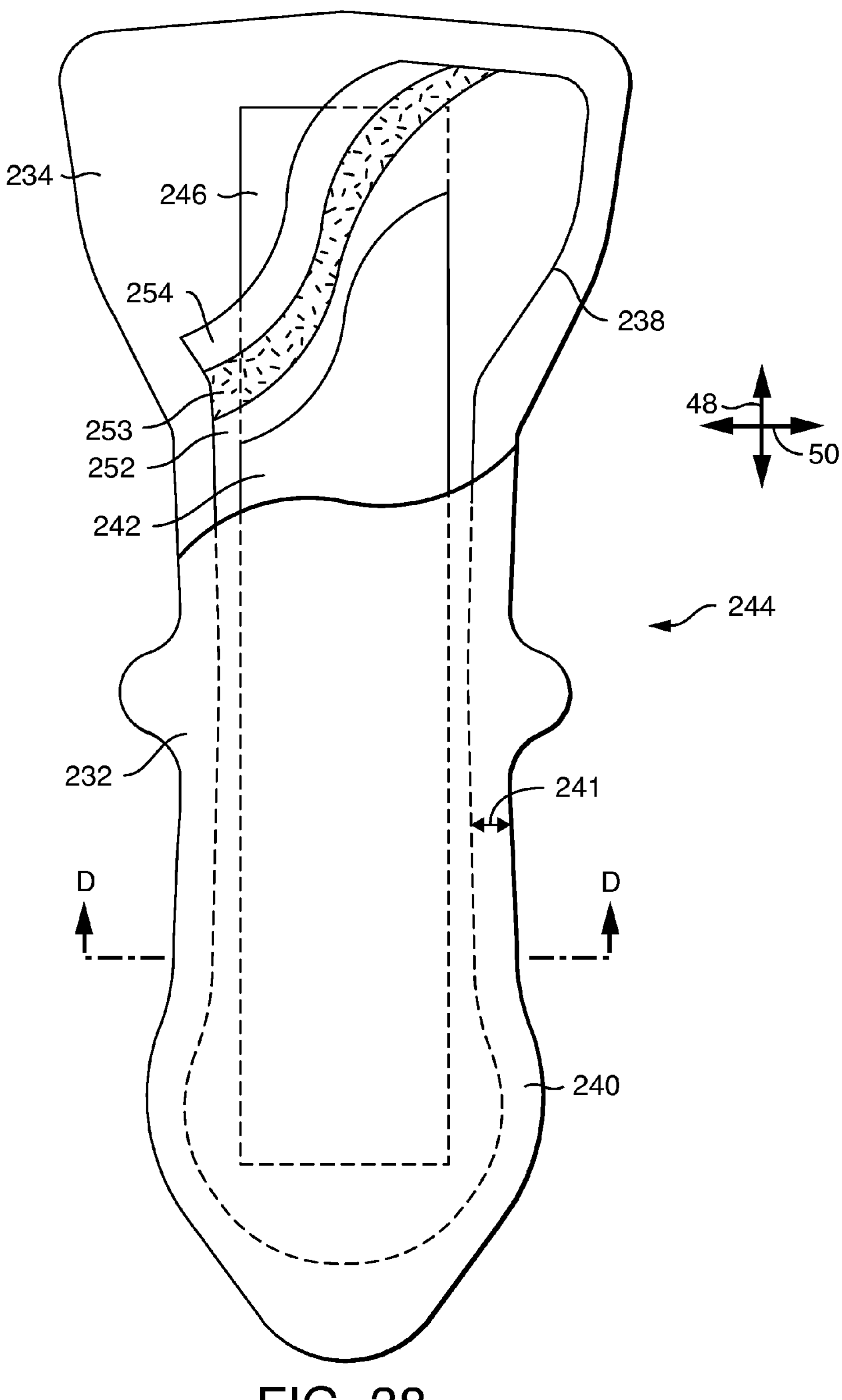


FIG. 38

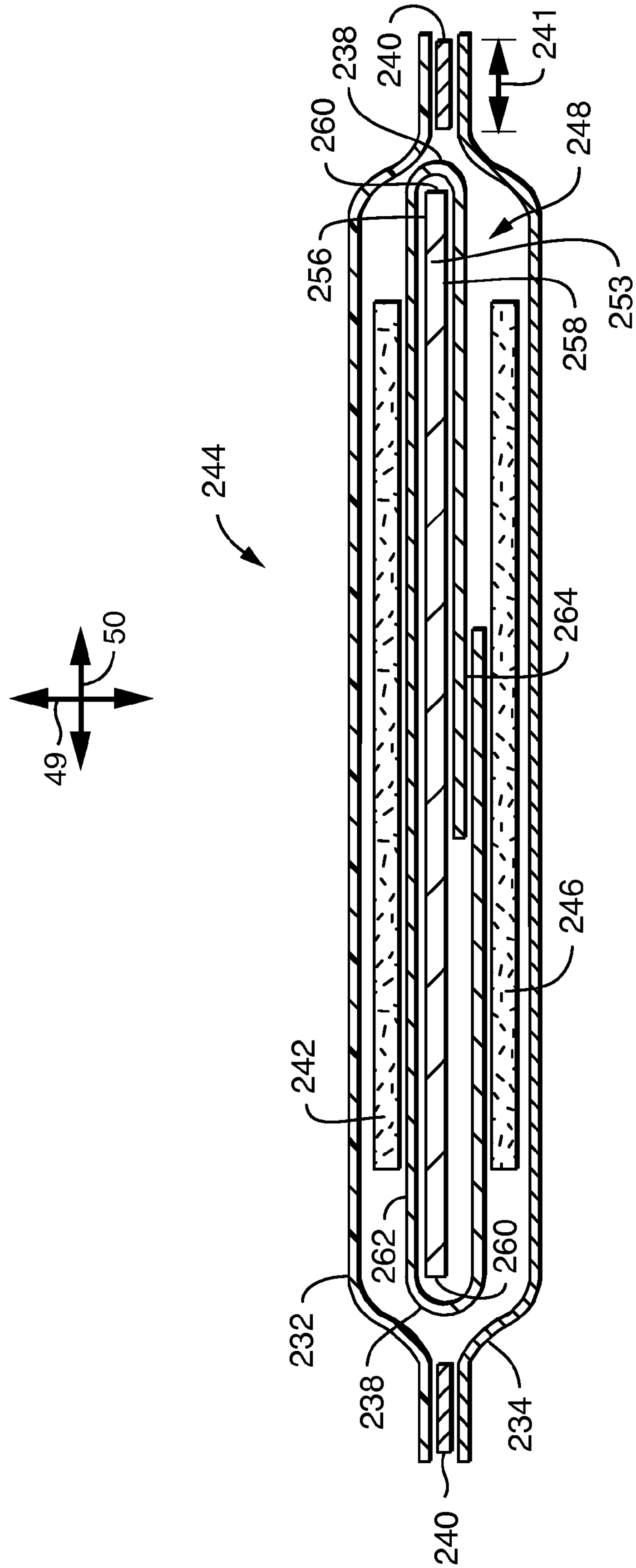

240
238
241
260
248
256
253
258
244
50
49
264
246
242
262
260
232
238
234
240

FIG. 39

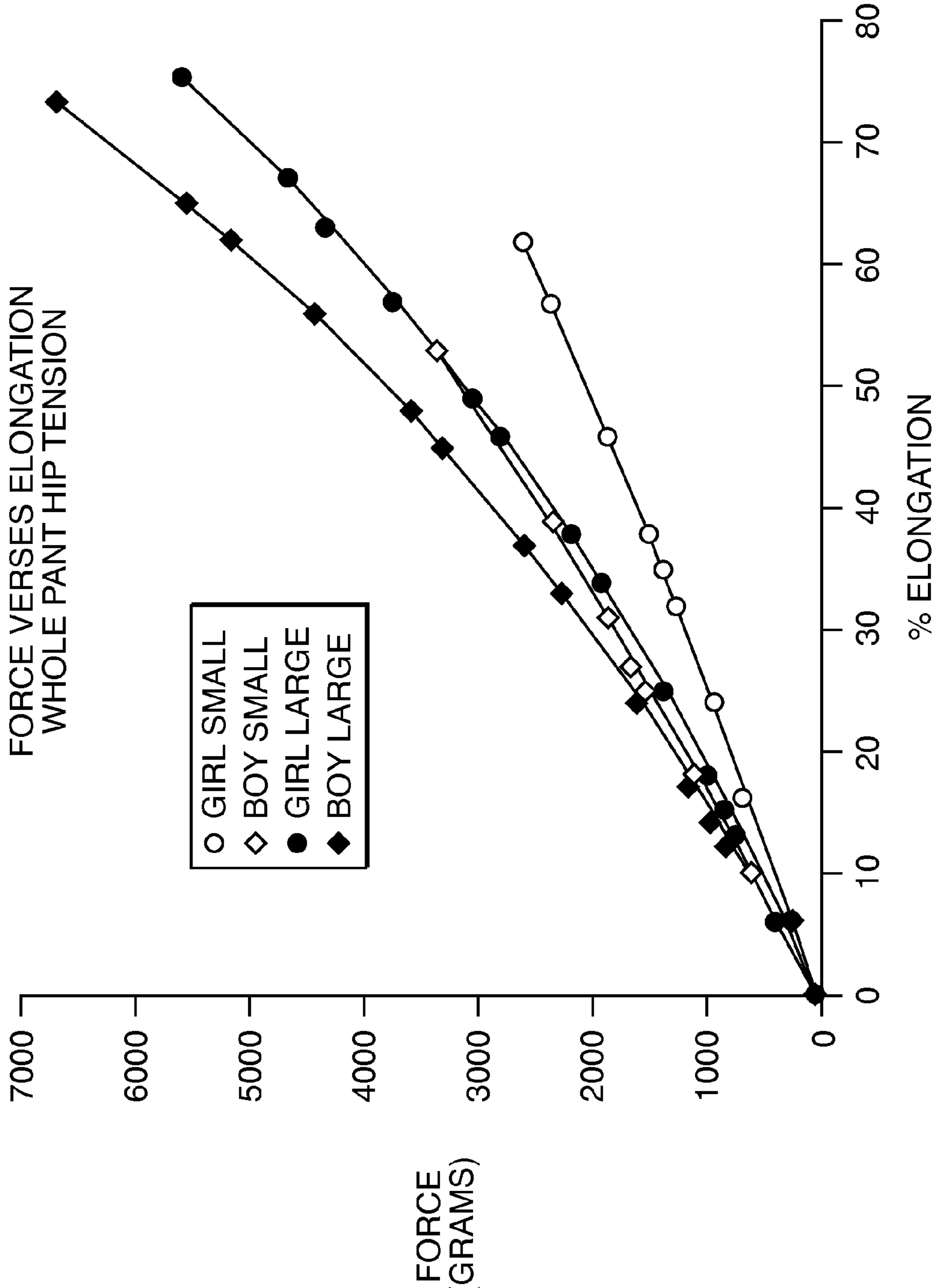

FORCE VERSES ELONGATION
WHOLE PANT HIP TENSION
GIRL SMALL
BOY SMALL
GIRL LARGE
BOY LARGE
FORCE (GRAMS)
0
1000
2000
3000
4000
5000
6000
7000
% ELONGATION
0
10
20
30
40
50
60
70
80

FIG. 40

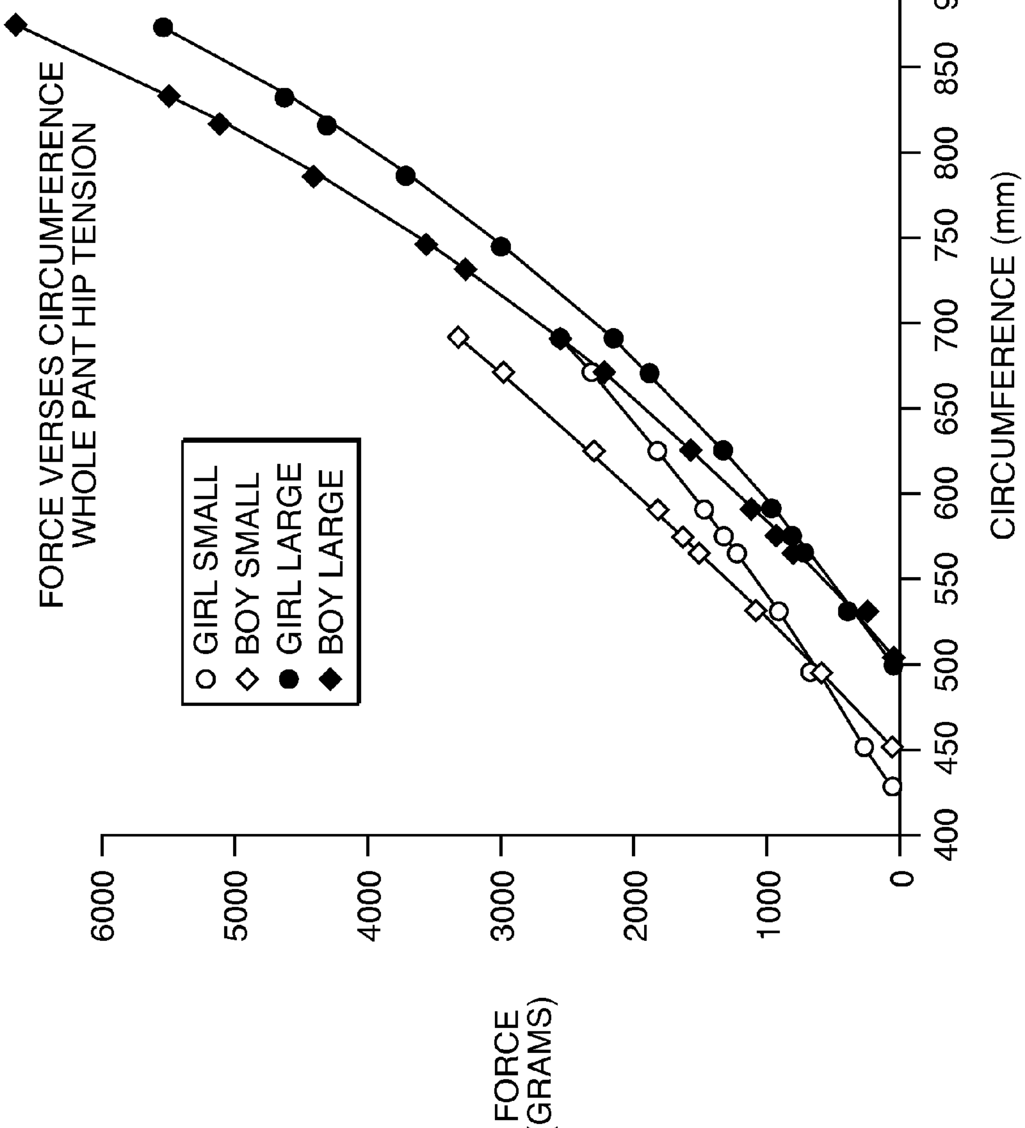

FORCE VERSES CIRCUMFERENCE
WHOLE PANT HIP TENSION
GIRL SMALL
BOY SMALL
GIRL LARGE
BOY LARGE
FORCE (GRAMS)
0
1000
2000
3000
4000
5000
6000
CIRCUMFERENCE (mm)
400
450
500
550
600
650
700
750
800
850
900

FIG. 41

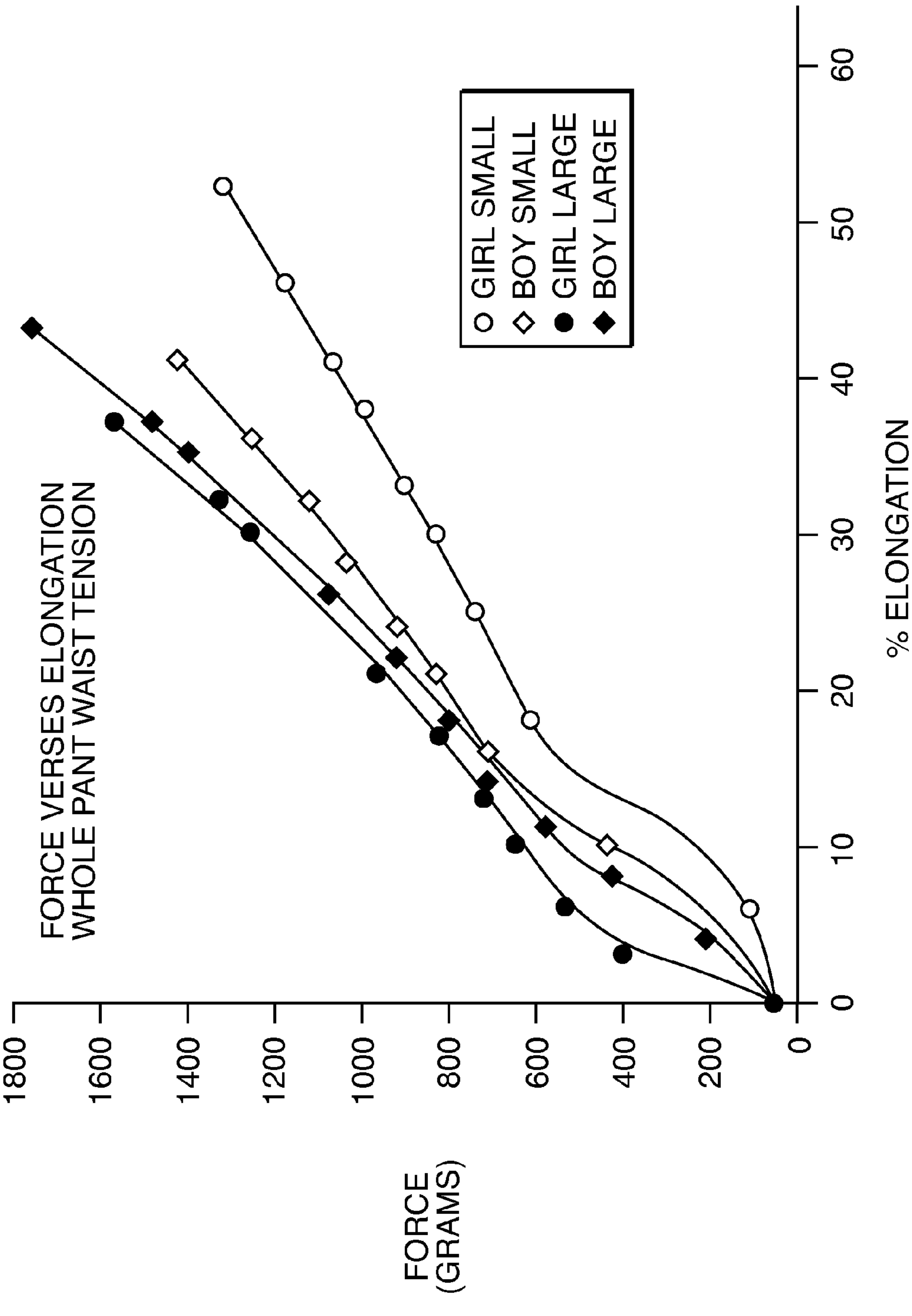

FORCE VERSES ELONGATION
WHOLE PANT WAIST TENSION
GIRL SMALL
BOY SMALL
GIRL LARGE
BOY LARGE
FORCE
(GRAMS)
% ELONGATION
0
200
400
600
800
1000
1200
1400
1600
1800
10
20
30
40
50
60

FIG. 42

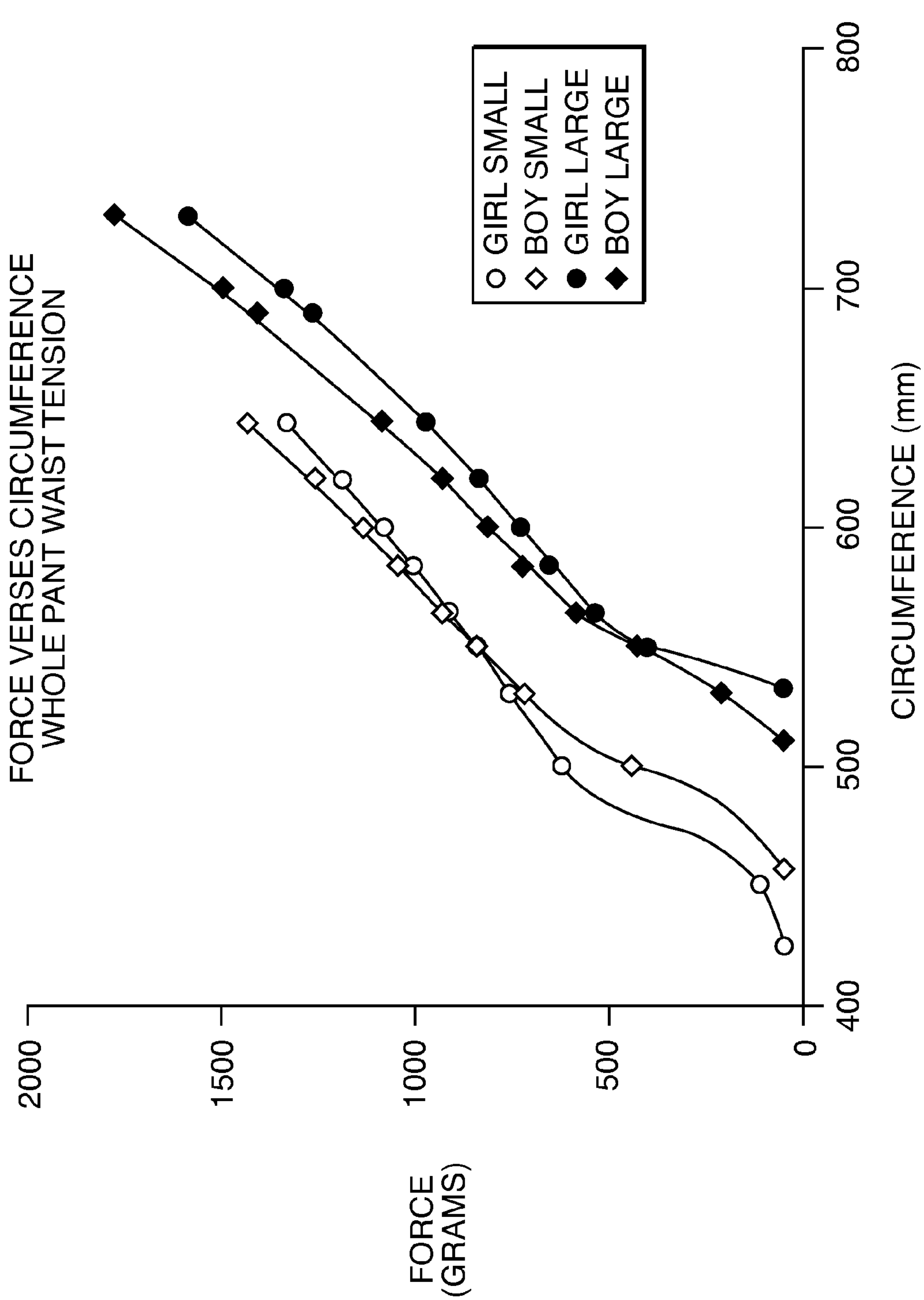

FORCE VERSES CIRCUMFERENCE
WHOLE PANT WAIST TENSION
GIRL SMALL
BOY SMALL
GIRL LARGE
BOY LARGE
FORCE
(GRAMS)
2000
1500
1000
500
0
400
500
600
700
800
CIRCUMFERENCE (mm)

FIG. 43

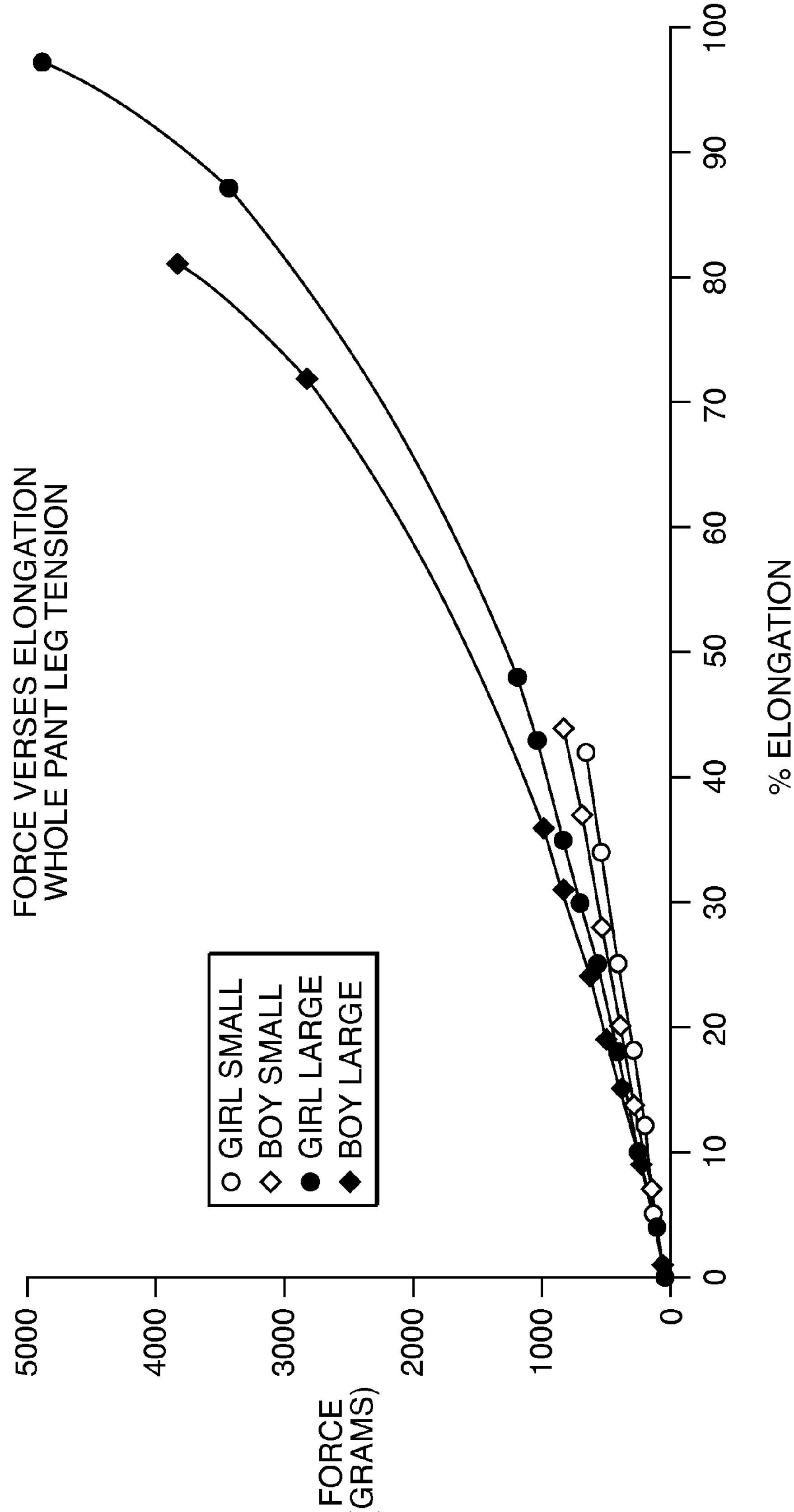

FORCE VERSES ELONGATION
WHOLE PANT LEG TENSION
GIRL SMALL
BOY SMALL
GIRL LARGE
BOY LARGE
FORCE
(GRAMS)
5000
4000
3000
2000
1000
0
0
10
20
30
40
50
60
70
80
90
100
% ELONGATION

FIG. 44

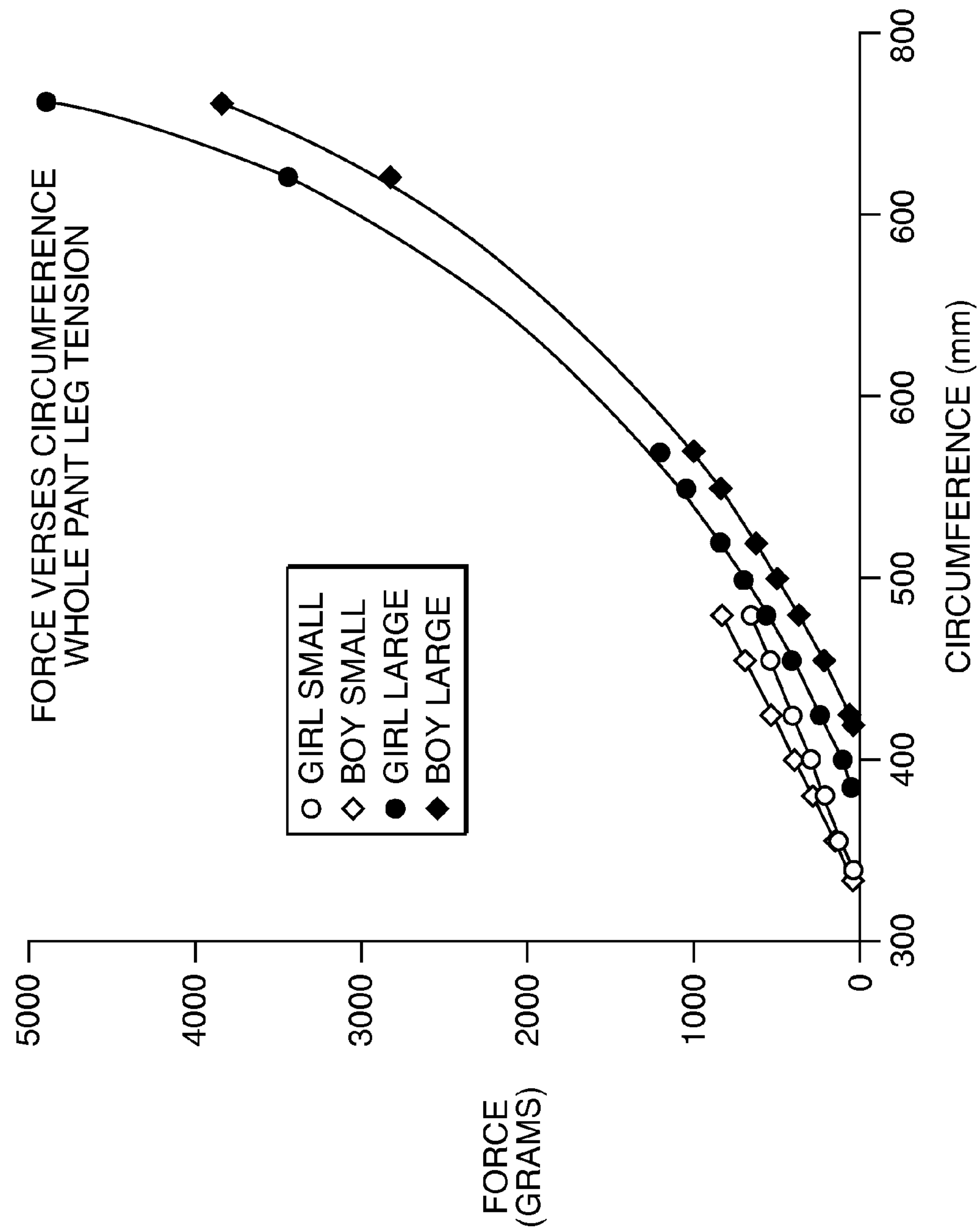

FORCE VERSES CIRCUMFERENCE
WHOLE PANT LEG TENSION
GIRL SMALL
BOY SMALL
GIRL LARGE
BOY LARGE
FORCE
(GRAMS)
5000
4000
3000
2000
1000
0
300
400
500
600
600
800
CIRCUMFERENCE (mm)

FIG. 45

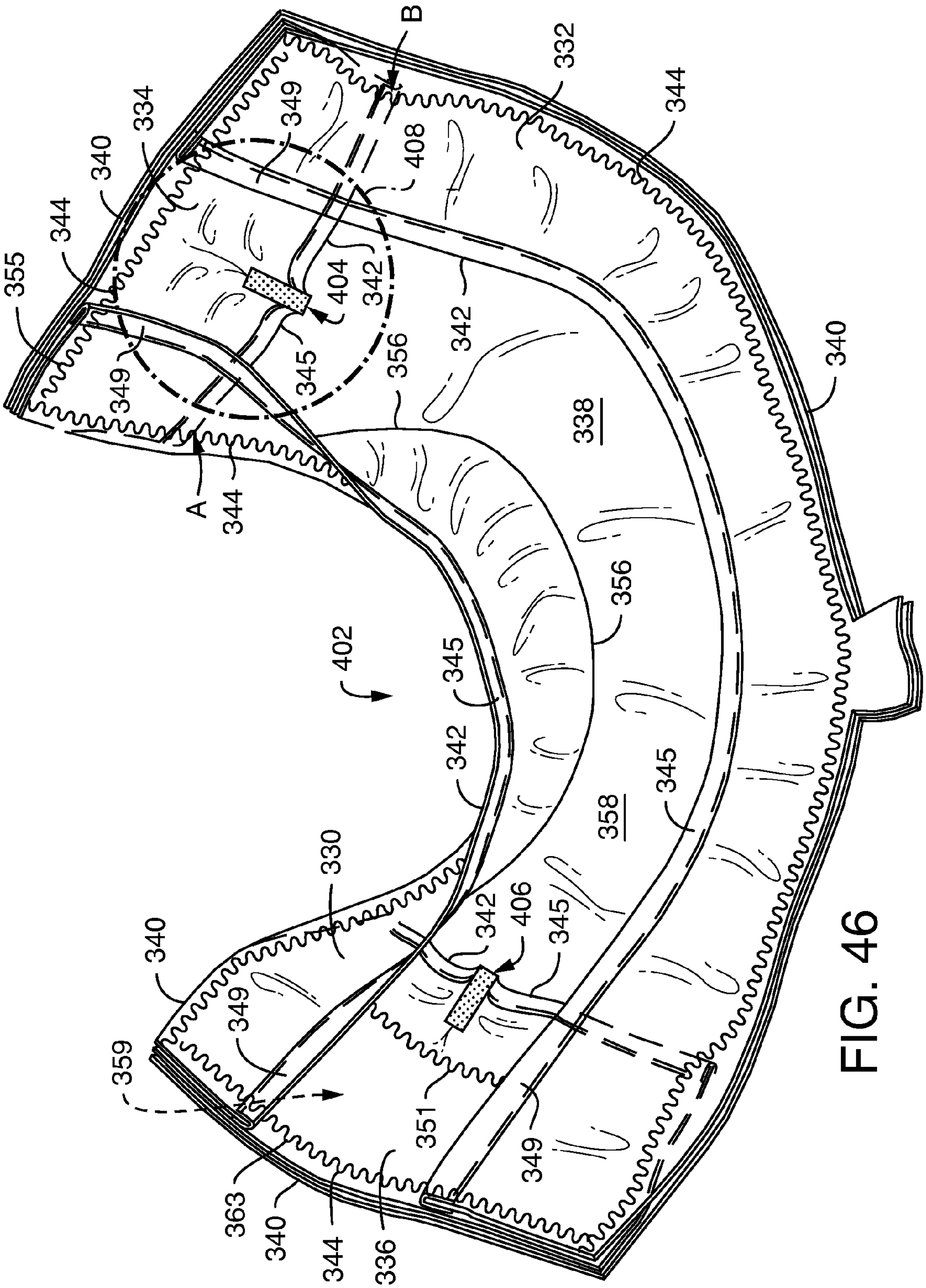

B
332
344
408
349
334
340
344
355
404
342
342
345
356
340
349
338
A
344
356
402
345
342
358
345
330
340
342
406
345
349
359
351
349
363
340
344
336

FIG. 46

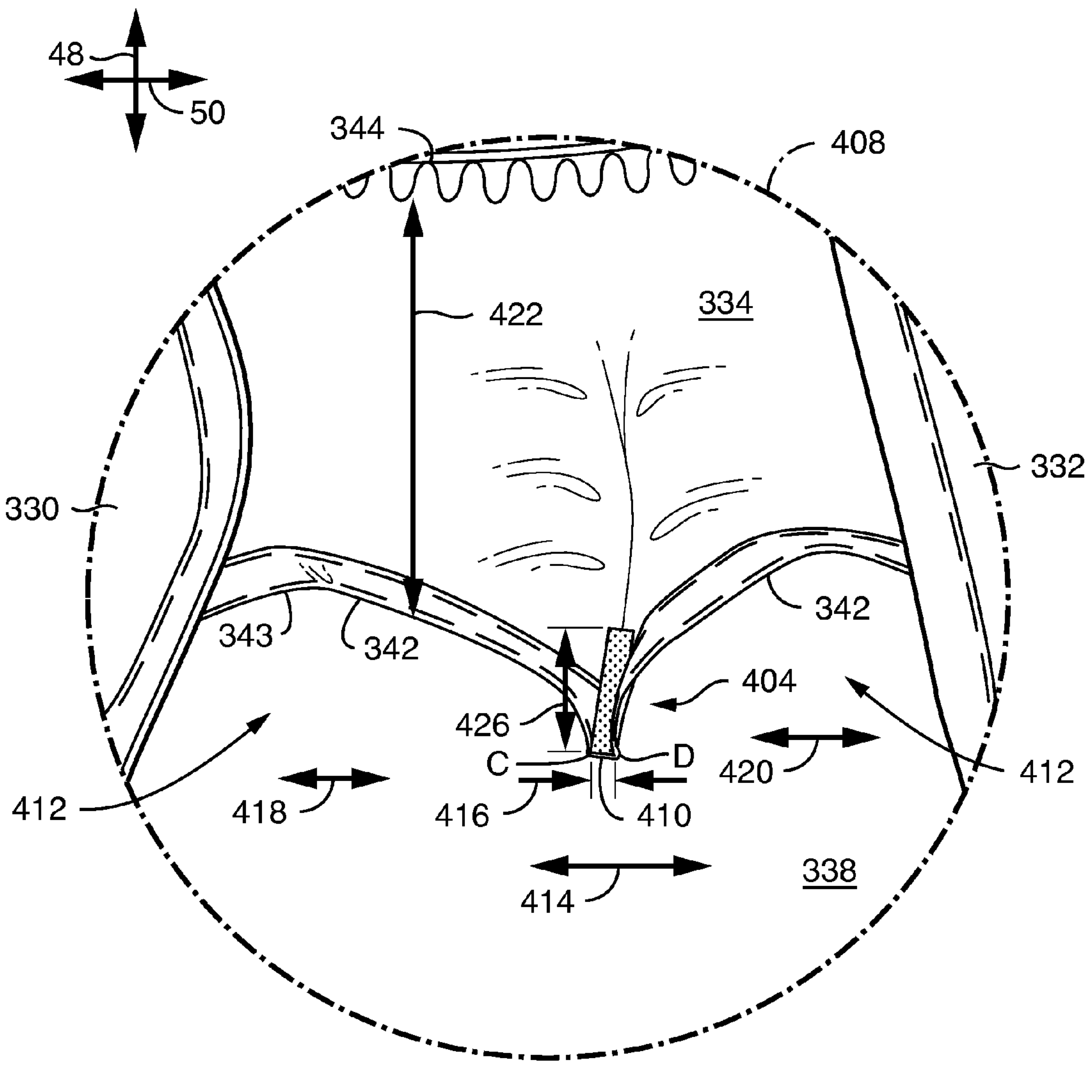

48
50
344
408
422
334
332
330
342
343
342
404
426
C
D
420
412
412
418
416
410
414
338

FIG. 47

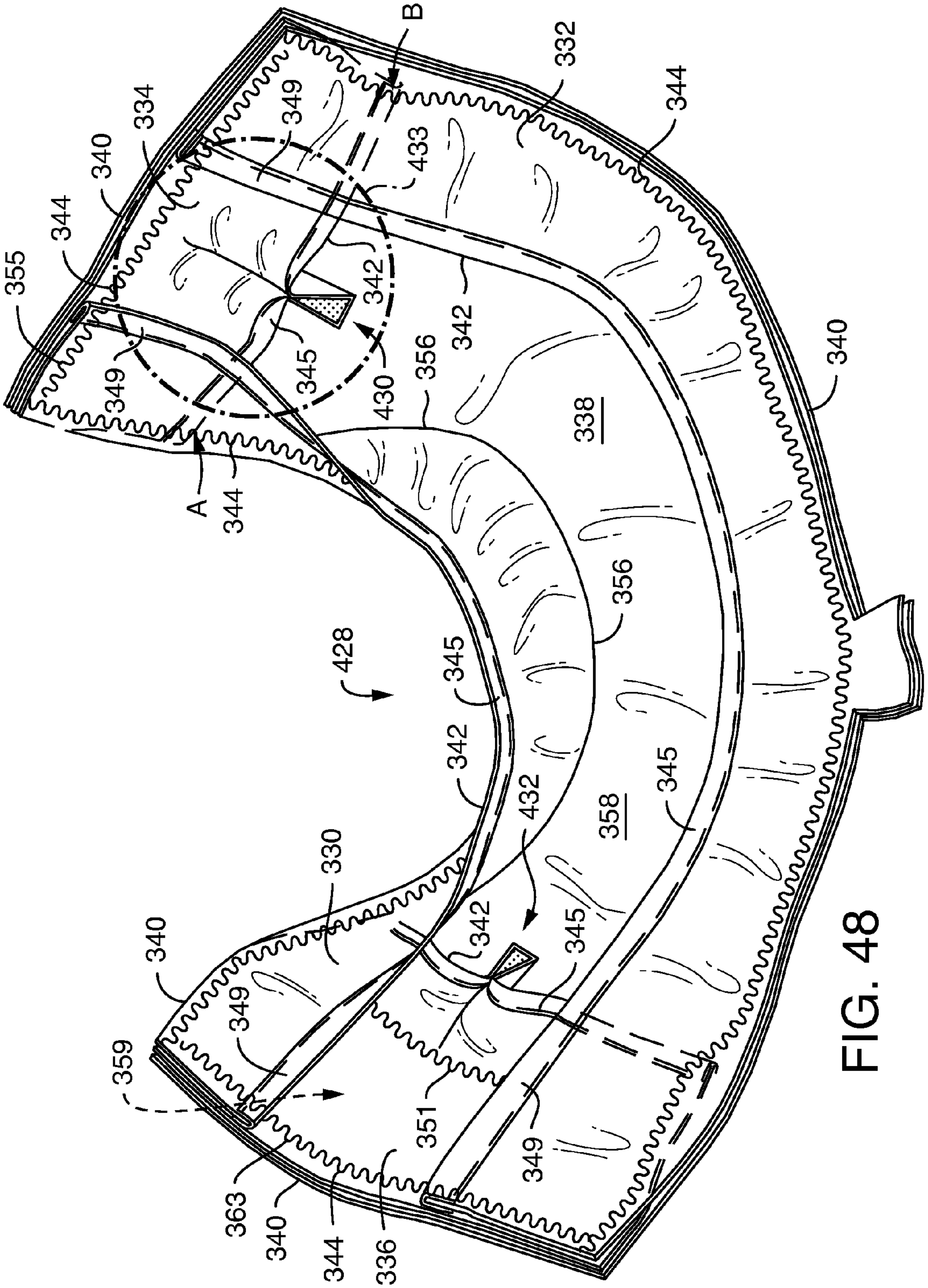

B
332
344
334
349
433
340
344
342
355
342
345
356
430
340
338
349
A
344
356
428
345
342
358
345
432
330
340
342
345
349
359
351
349
363
340
344
336

FIG. 48

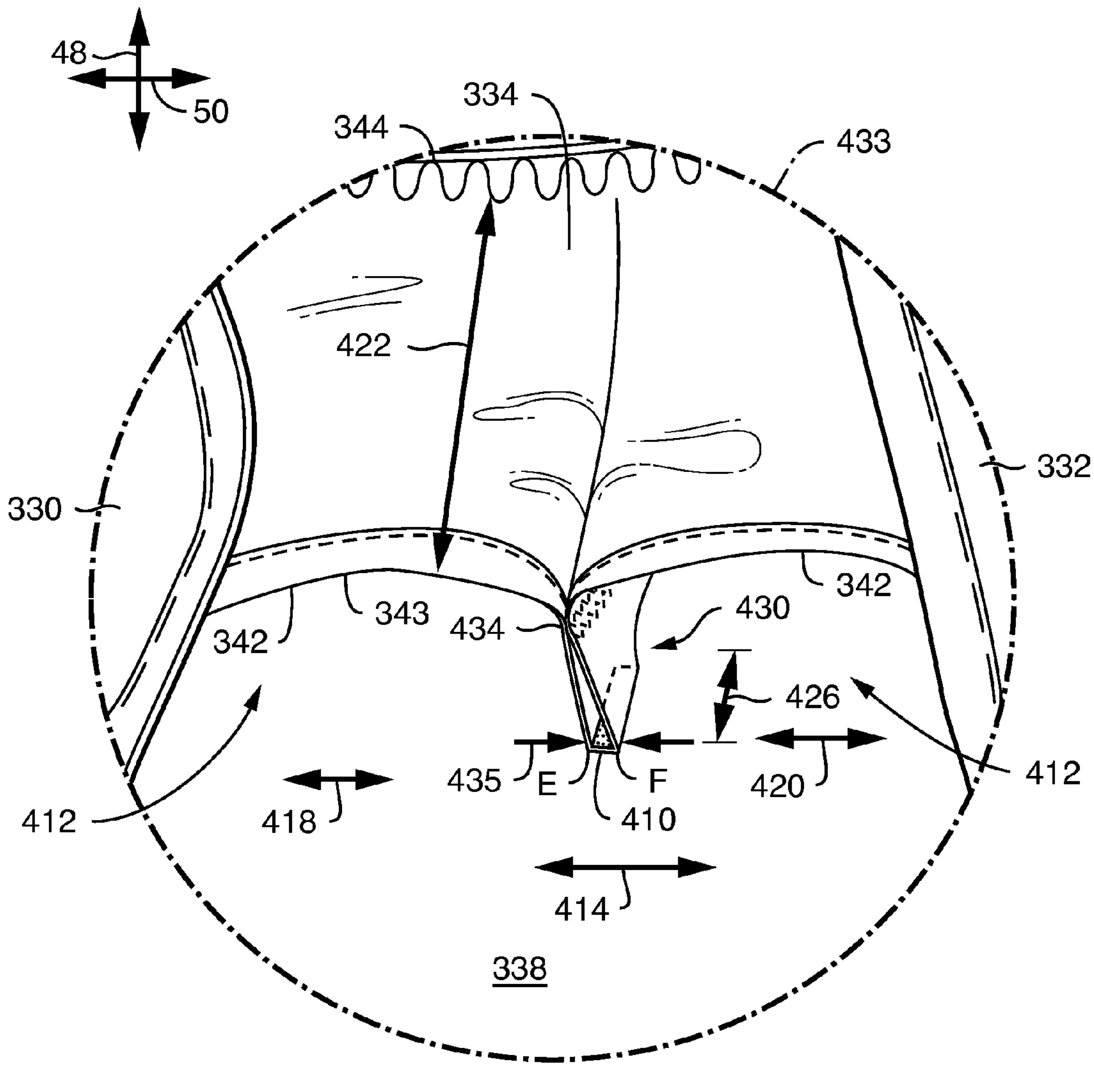
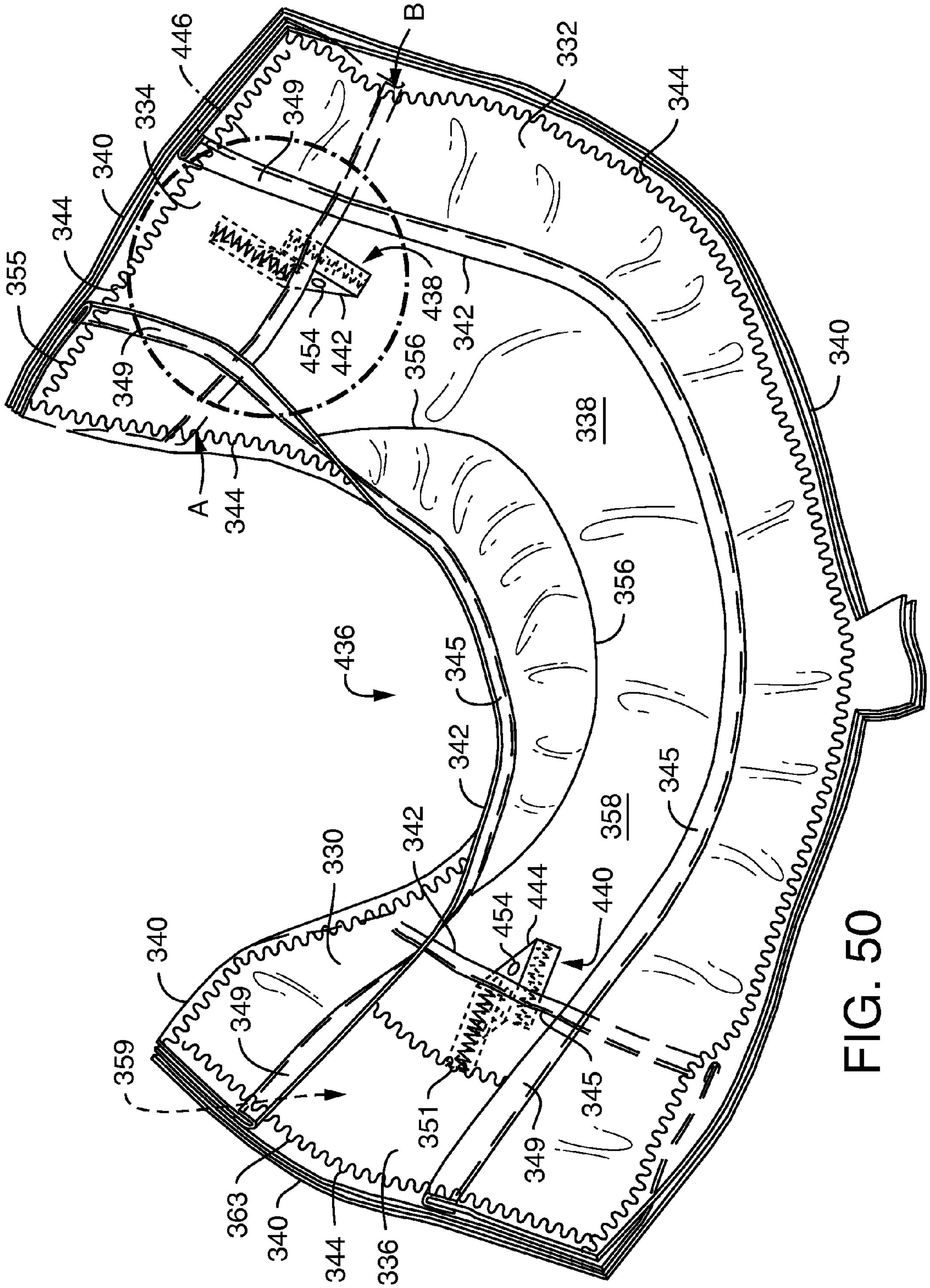

48
50
334
344
433
422
332
330
342
343
434
430
342
426
412
435
E
F
420
412
418
410
414
338

FIG. 49



B
446
332
344
349
334
340
344
355
438
342
454
442
356
349
340
338
A
344
356
436
345
342
345
358
342
330
454
444
440
340
349
359
351
345
349
363
340
344
336

FIG. 50

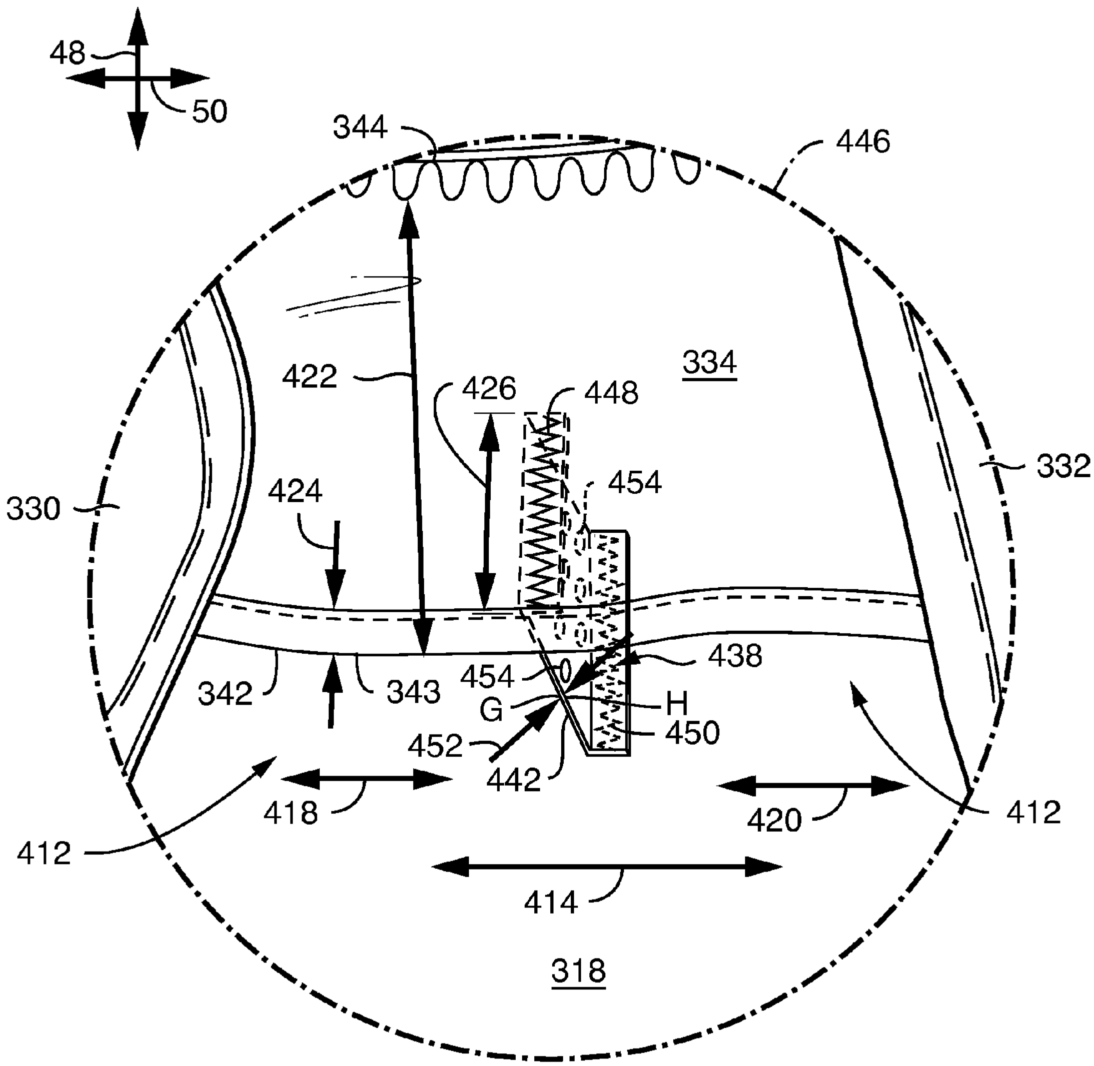

48
50
344
446
334
422
426
448
454
332
330
424
438
342
343
454
G
H
452
450
442
412
418
420
412
414
318

FIG. 51

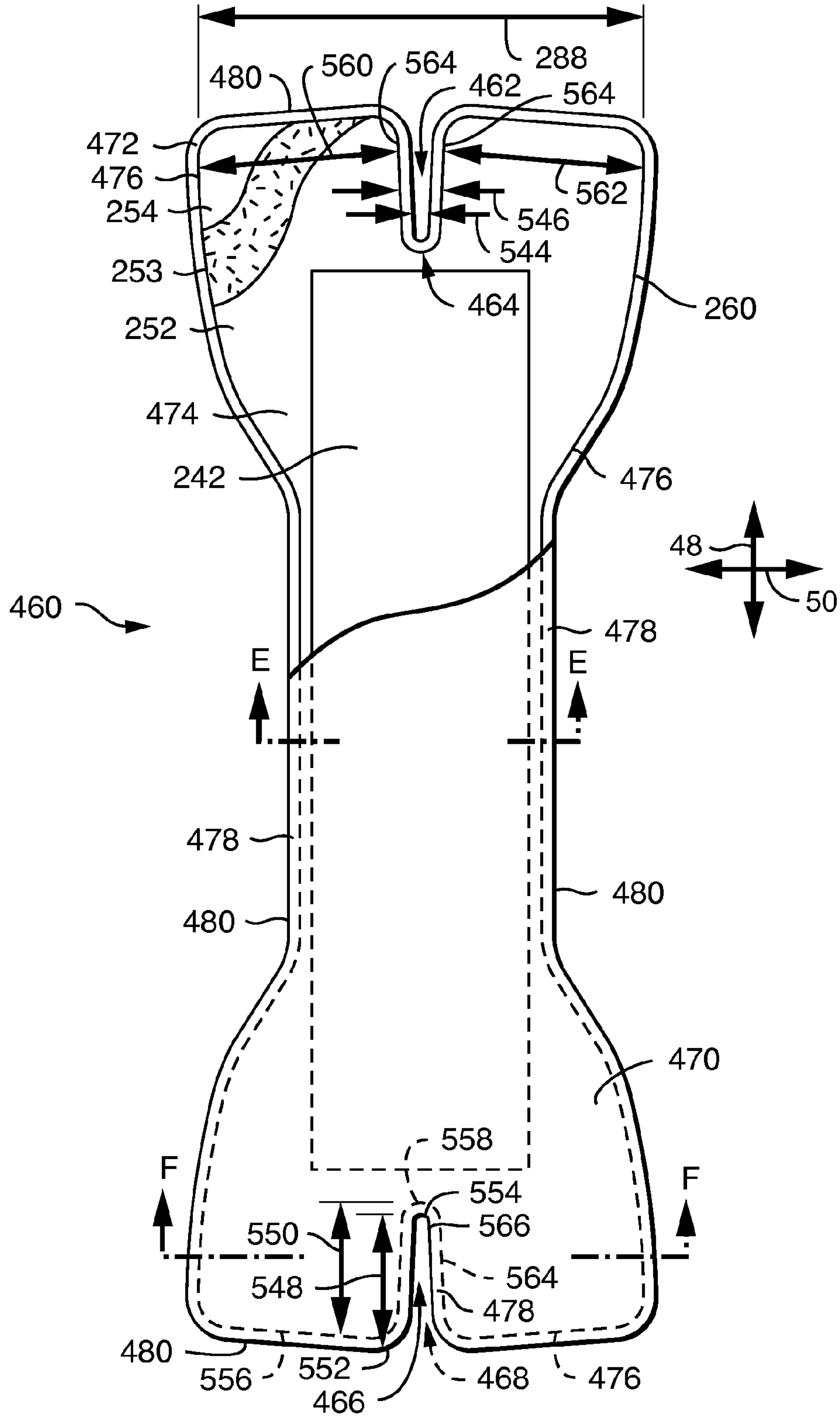

288
480
560
564
462
564
472
476
562
254
546
544
253
464
260
252
474
242
476
48
50
460
478
E
E
478
480
480
470
558
F
F
554
550
566
564
548
478
480
552
556
466
468
476

FIG. 52

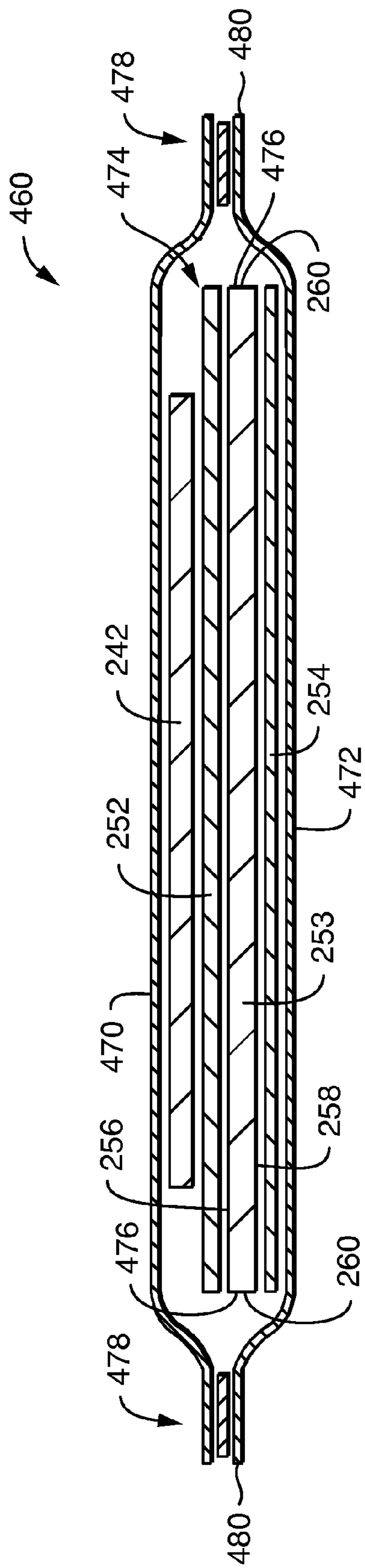

460
478
480
474
476
260
242
254
472
252
253
470
258
256
476
260
478
480

FIG. 53

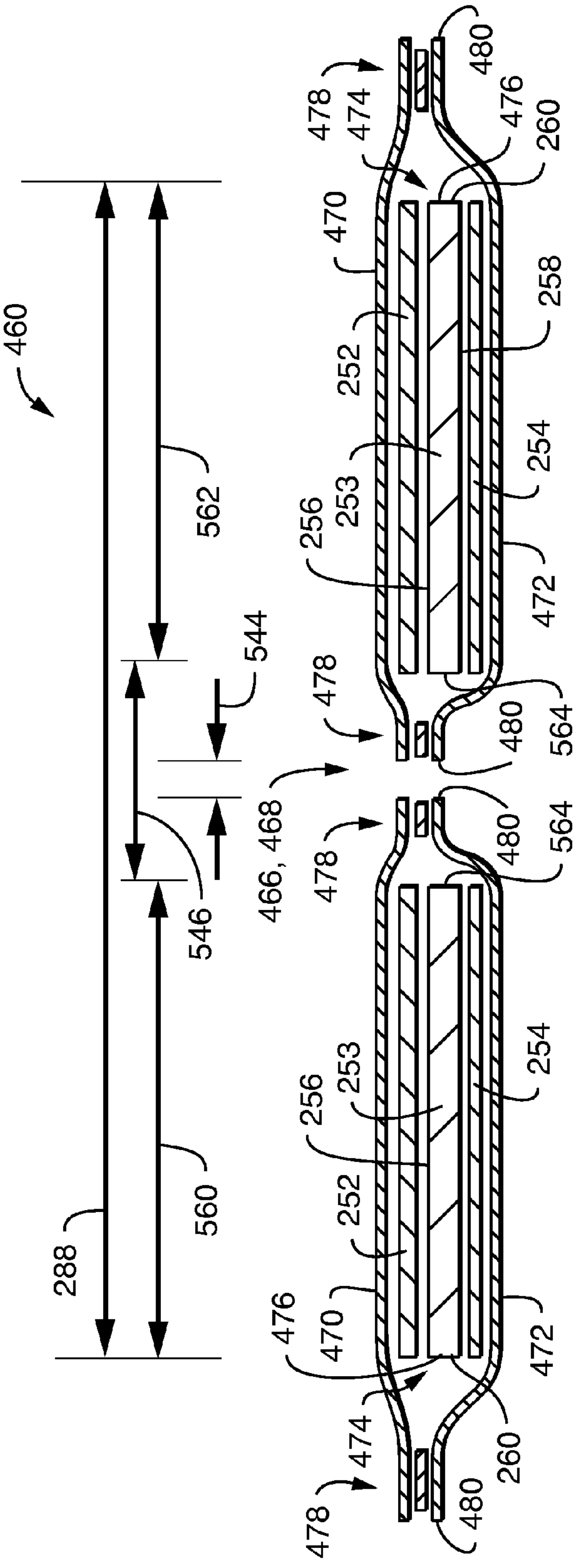

460
288
560
562
544
546
466, 468
478
474
476
470
252
256
253
254
472
260
480
258
564

FIG. 54

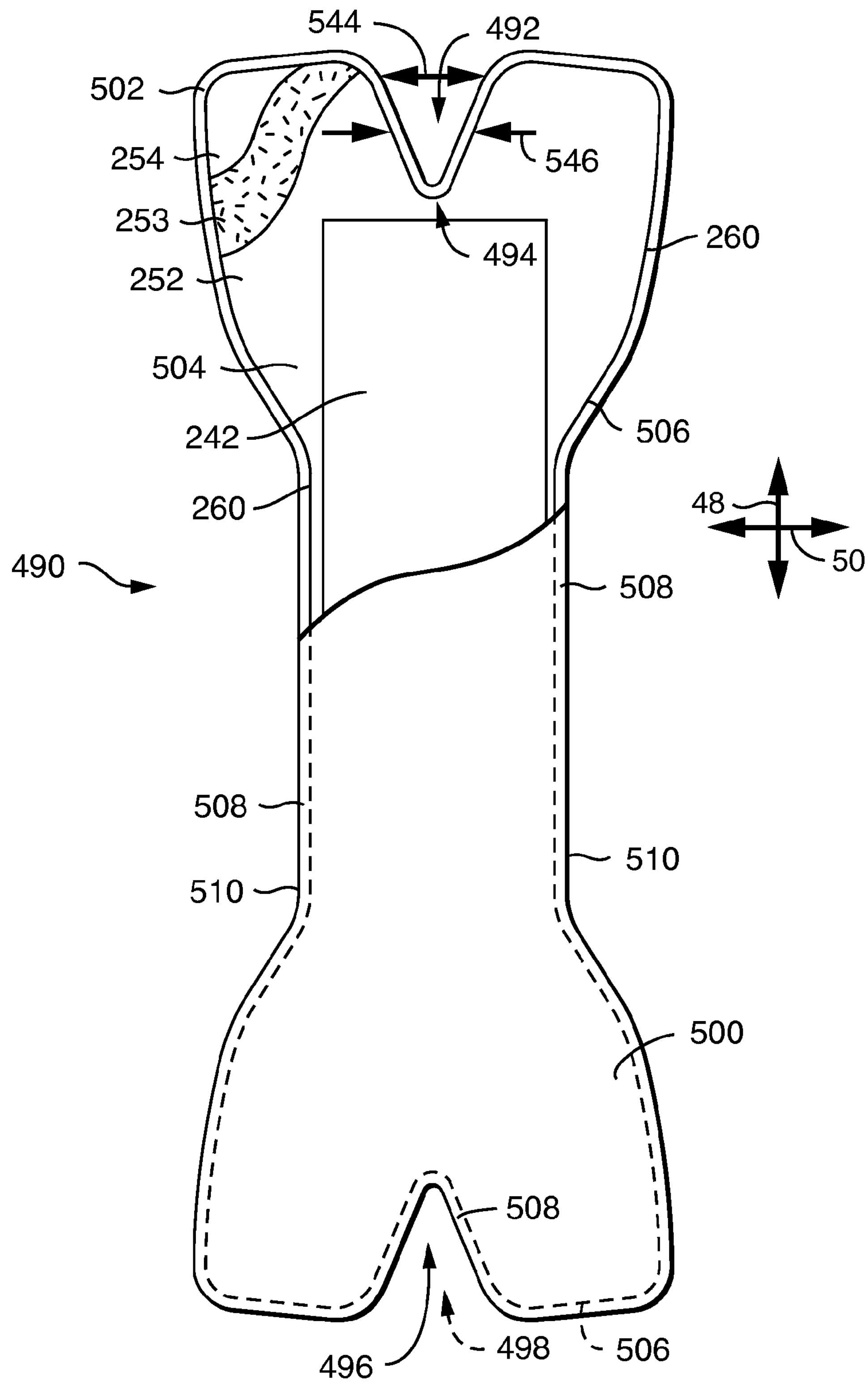

544
492
502
254
546
253
494
260
252
504
242
506
260
48
50
490
508
508
510
510
500
508
496
498
506

FIG. 55

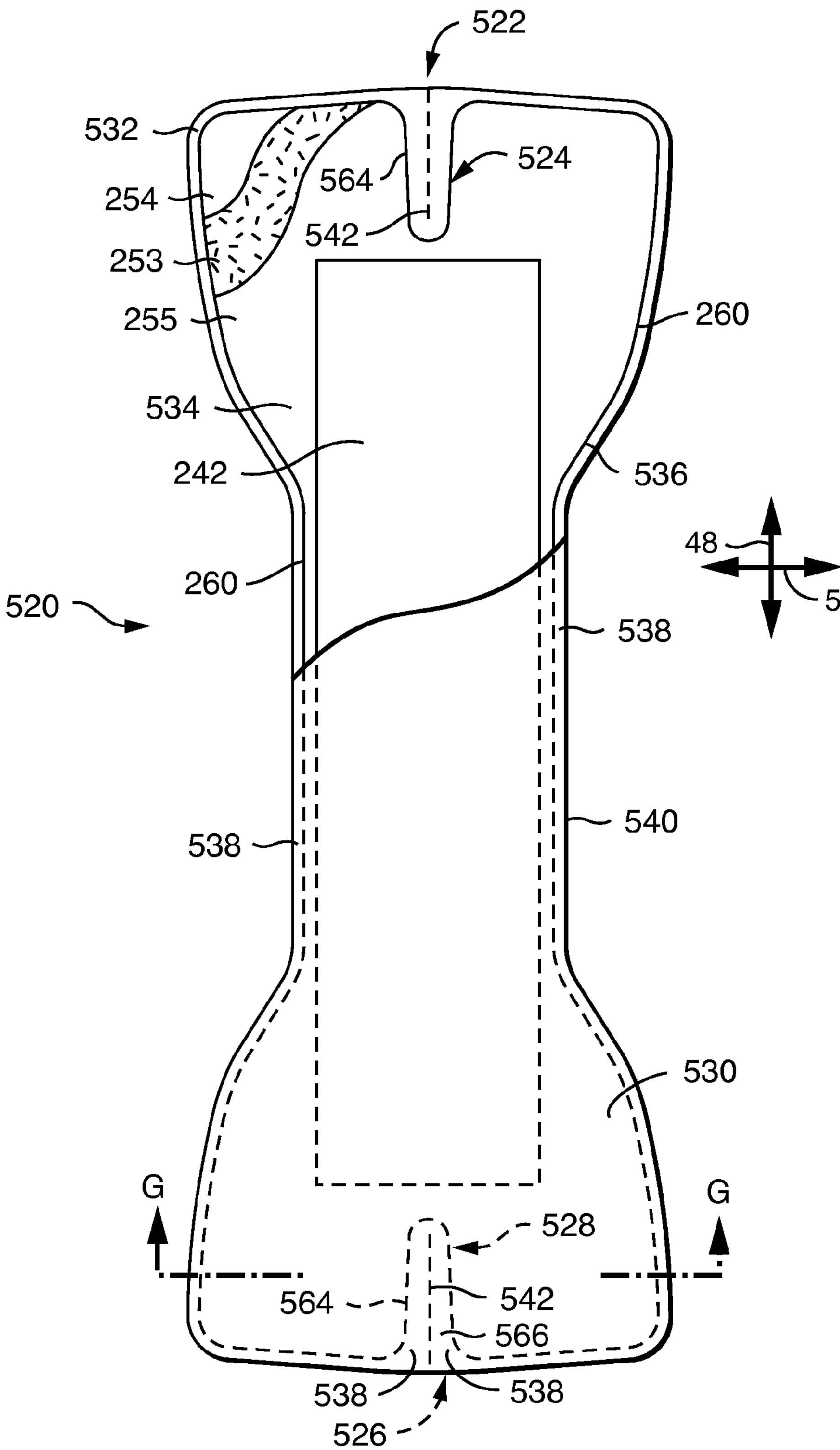

522
532
524
564
254
542
253
255
260
534
242
536
48
260
520
50
538
540
538
530
G
G
528
564
542
566
538
538
526

FIG. 56

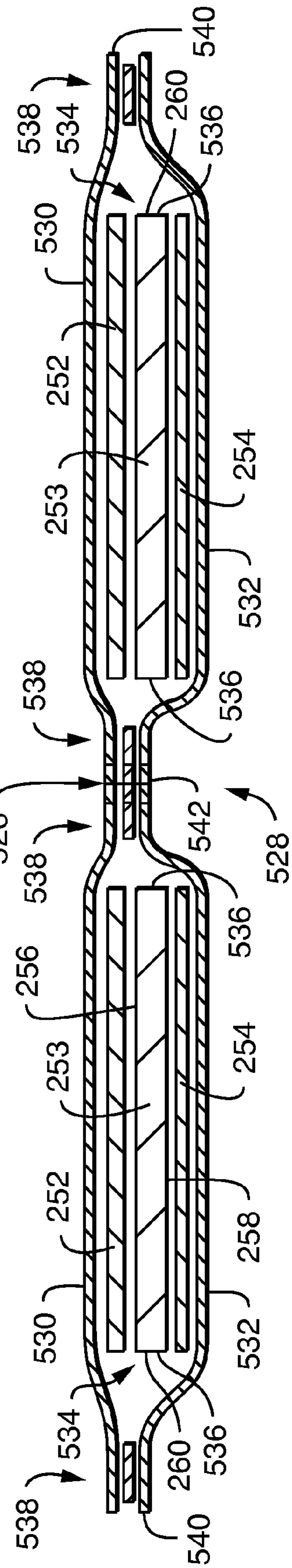

540
538
534
260
536
530
520
252
253
254
532
538
536
526
542
538
528
256
253
254
252
258
530
532
534
260
536
538
540

FIG. 57

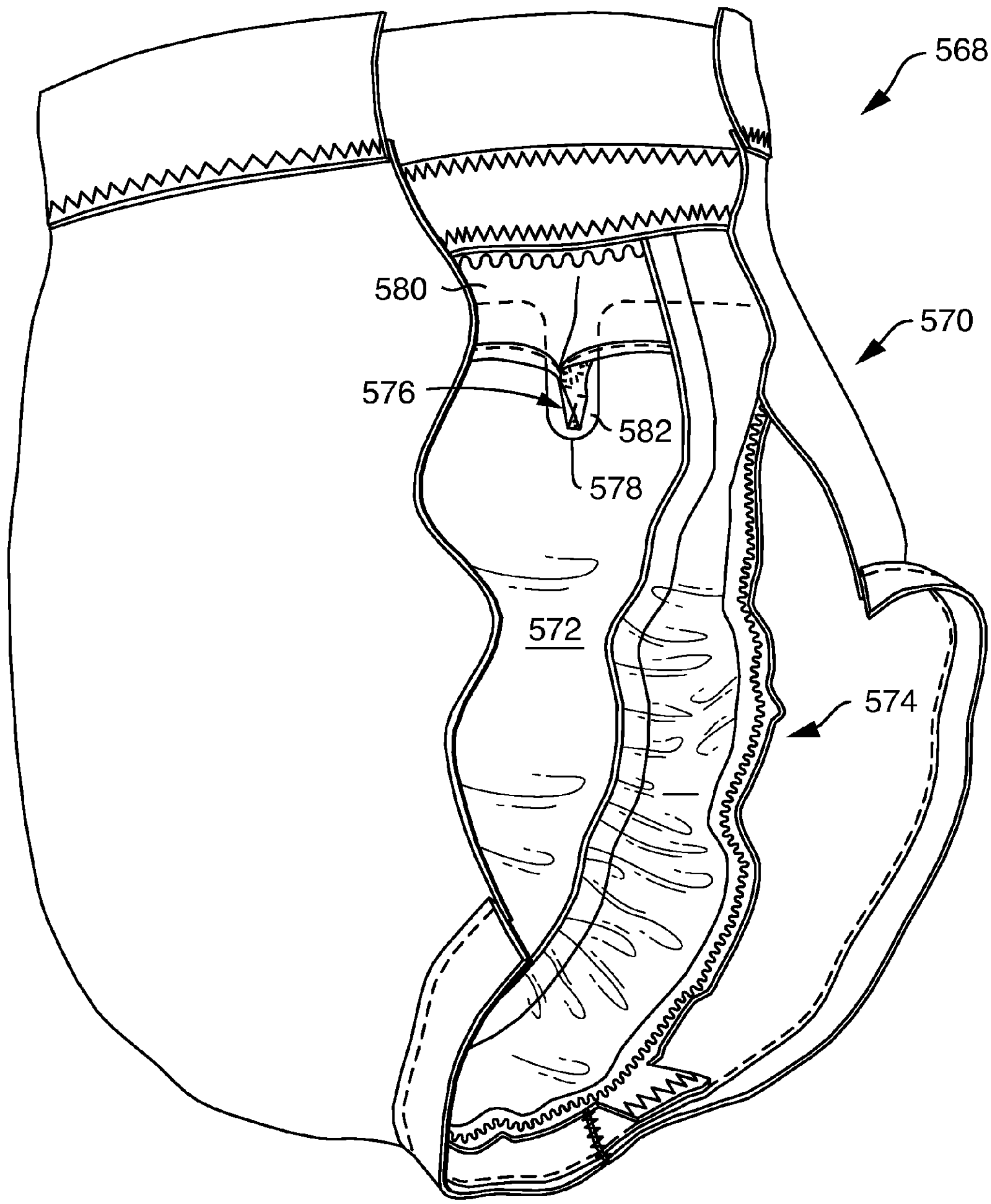


FIG. 58

ABSORBENT INSERT WITH POSITIONING NOTCH

REFERENCE TO PRIOR-FILED APPLICATION

This application is a continuation-in-part of application Ser. No. 13/548,012, entitled CONTAINMENT SYSTEM, and filed Jul. 12, 2012.

BACKGROUND OF THE INVENTION

While disposable absorbent garments offer a convenient way to manage bedwetting, many enuretic families are not satisfied with these products because they are viewed as "diaper-like" by the user who wants to wear conventional underwear. As such, many improvements have been made to disposable absorbent garments to make them more underwear-like. For example, gender specific graphics have been added and softer nonwoven materials have been utilized. However, many potential users still seek a product that looks and feels more like conventional underwear but is still able to help manage bedwetting. Thus, there remains a need for a pant that is underwear-like yet helps to contain urine insults.

SUMMARY OF THE INVENTION

In one aspect, the present invention provides a discrete absorbent insert having a first sheet, a second sheet in facing relation with the first sheet, and an absorbent core positioned between the first sheet and the second sheet. The absorbent core defines a core perimeter which includes a first absorbent core positioning notch. The first sheet and the second sheet extend beyond the core perimeter and are joined together to form a perimeter seal. The perimeter seal defines an absorbent insert perimeter which includes a first absorbent insert positioning notch. The first absorbent core positioning notch has a depth of 30 to 60 mm,
the first absorbent insert positioning notch has a depth of 30 to 60 mm, and the first absorbent insert positioning notch is aligned with the first absorbent core positioning notch.

In some embodiments, the first absorbent insert positioning notch depth is 75 to 100% the first absorbent core positioning notch depth. In some embodiments, the first absorbent core positioning notch has a mid-point width of 10 to 25 mm and the first absorbent insert positioning notch has a mid-point width of 1 to 15 mm.

In some embodiments, the first sheet and the second sheet extend a uniform amount beyond the entire core perimeter and the perimeter seal has a uniform width around the entire absorbent core perimeter. In some embodiments, the perimeter seal has a greater width within the absorbent core positioning notch as compared to the remainder of the absorbent core perimeter.

In some embodiments, the absorbent core further includes at least 40% superabsorbent, an intake layer positioned between the first sheet and the absorbent core and having a basis weight of at least 85 gsm, and an absorbent capacity of at least 600 g.

In some embodiments, the first sheet and the second sheet are fluid permeable. In some embodiments, the discrete absorbent insert is devoid of a fluid-impervious layer.

In various embodiments, the absorbent core also defines a longitudinal direction, a first end section, a second end section, and a central section. The central section is positioned between the first end section and the second end section. The first end section defines a maximum width of at least 135 mm, the central section defines a maximum width of less than 90 mm, and the second end section defines a maximum width of at least 135 mm.

In various embodiments, the absorbent core also defines an absorbent core length, as measured in the longitudinal direction, of 340 to 450 mm.

In some embodiments, the first absorbent core positioning notch is located in the first end section and the core perimeter includes a second absorbent core positioning notch located in the second end section. The second absorbent core positioning notch has a depth of 30 to 60 mm, the second absorbent insert positioning notch has a depth of 30 to 60 mm, and the second absorbent insert positioning notch is aligned with the second absorbent core positioning notch.

In another aspect, the present invention provides a discrete absorbent insert having a first sheet, a second sheet in facing relation with the first sheet, and an absorbent core positioned between the first sheet and the second sheet. The absorbent core defines a core perimeter which includes a first absorbent core positioning notch, at least 40% superabsorbent, and an absorbent capacity of at least 600 g. The absorbent insert also includes an intake layer positioned between the first sheet and the absorbent core and having a basis weight of at least 85 gsm. The first sheet and the second sheet extend beyond the core perimeter and are joined together to form a perimeter seal which defines an absorbent insert perimeter which includes a first absorbent insert positioning notch. The first absorbent core positioning notch has a depth of 30 to 60 mm, the first absorbent insert positioning notch has a depth that is 75 to 100% of the first absorbent core positioning notch depth, and the first absorbent insert positioning notch is aligned with the first absorbent core positioning notch.

In various embodiments, the first absorbent core positioning notch is located in the first end section and the core perimeter includes a second absorbent core positioning notch located in the second end section. The first absorbent insert positioning notch is located in the first end section and the absorbent insert perimeter includes a second absorbent insert positioning notch located in the second end section. The second absorbent core positioning notch has a depth of 30 to 60 mm, the second absorbent insert positioning notch has a depth of 30 to 60 mm, and the second absorbent insert positioning notch is aligned with the second absorbent core positioning notch.

In some embodiments, the first absorbent insert positioning notch is a closed notch and comprises a line of weakness. In some embodiments, the first absorbent core positioning notch has a midpoint width of 10 to 25 mm and is aligned with the first absorbent insert positioning notch. In various embodiments, the first sheet and the second sheet extend a uniform amount beyond the entire core perimeter and the perimeter seal has a uniform width around the entire absorbent core perimeter. In some embodiments, the first absorbent core positioning notch and the second absorbent core positioning notch have a midpoint width of 10 to 25 mm and are centered in a transverse direction.

In another aspect, the present invention provides a discrete absorbent insert having a fluid permeable first sheet, a fluid permeable second sheet in facing relation with the first sheet, and an absorbent core positioned between the first sheet and the second sheet. The absorbent core defines a longitudinal direction, a first end section, a second end section, and a central section. The central section is positioned between the first end section and the second end section. The absorbent core also defines a core perimeter which includes a first absorbent core positioning notch located in the first end section, a second absorbent core positioning notch located in the second end section, at least 40% superabsorbent, and an absorbent capacity of at least 600 g. The absorbent insert also includes an intake layer positioned between the first sheet and the absorbent core and having a basis weight of at least 85 gsm. The first sheet and the second sheet extend beyond the core perimeter and are joined together to form a perimeter seal which defines an absorbent insert perimeter which includes a first absorbent insert positioning notch and a second absorbent insert positioning notch. The first absorbent core positioning notch and the second absorbent core positioning notch have a depth of 30 to 60 mm and a mid-point width of 10 to 25 mm. The first absorbent insert positioning notch and the second absorbent insert positioning notch have a depth that is 75 to 100% the first absorbent core positioning notch depth and the second absorbent core positioning notch depth respectively. The first absorbent insert positioning notch is aligned with the first absorbent core positioning notch and the second absorbent insert positioning notch is aligned with the second absorbent core positioning notch. The discrete absorbent insert is devoid of a fluid-impervious layer.

In various embodiments, the first end section defines a maximum width of at least 135 mm, the central section defines a maximum width of less than 90 mm, the second end section defines a maximum width of at least 135 mm, and the absorbent core also defines an absorbent core length of 340 to 450 mm as measured in the longitudinal direction.

In some embodiments, the first sheet and the second sheet extend a uniform amount beyond the entire core perimeter and the perimeter seal has a uniform width around the entire absorbent core perimeter.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** representatively illustrates a front perspective view of an exemplary containment pant of the present invention.

FIGS. **2** and **3** representatively illustrate a side perspective view of the containment pant of FIG. **1** with the chassis partially severed to illustrate internal structure.

FIGS. **4** and **5** representatively illustrate a top plan view of the component pieces of the outer shell of the containment pant of FIG. **1**.

FIG. **6** representatively illustrates a front perspective view of another exemplary containment pant of the present invention.

FIGS. **7** and **8** representatively illustrate a side perspective view of the containment pant of FIG. **6** with the chassis partially severed to illustrate internal structure.

FIGS. **9** and **10** representatively illustrate a top plan view of the component pieces of the outer shell of the containment pant of FIG. **6**.

FIG. **11** representatively illustrates a top plan view of component parts of a first exemplary pouch and sling of the present invention.

FIG. **12** representatively illustrates a fully constructed pouch made from the component parts of FIG. **11**.

FIG. **13** representatively illustrates a fully constructed sling made from the component parts of FIG. **11**.

FIG. **14** representatively illustrates a cross-sectional view of the sling of FIG. **13** taken along the line A-A.

FIGS. **15** and **16** representatively illustrate side perspective views of the fully constructed sling of FIG. **13** incorporated in a chassis that is partially severed to illustrate internal structure.

FIG. **17** representatively illustrates a top plan view of component parts of a second exemplary pouch and sling of the present invention.

FIG. **18** representatively illustrates a fully constructed pouch made from the component parts of FIG. **17**.

FIG. **19** representatively illustrates a fully constructed sling made from the component parts of FIG. **17**.

FIG. **20** representatively illustrates a cross-sectional view of the sling of FIG. **19** taken along the line B-B.

FIGS. **21** and **22** representatively illustrate side perspective views of the fully constructed sling of FIG. **19** incorporated in a chassis that is partially severed to illustrate internal structure.

FIG. **23** representatively illustrates a top plan view of component parts of a third exemplary pouch and sling of the present invention.

FIG. **24** representatively illustrates a fully constructed pouch made from the component parts of FIG. **23**.

FIG. **25** representatively illustrates a fully constructed sling made from the component parts of FIG. **23**.

FIGS. **26** and **27** representatively illustrate side perspective views of the fully constructed sling of FIG. **25** incorporated in a chassis that is partially severed to illustrate internal structure.

FIG. **28** representatively illustrates a top plan view of component parts of another exemplary pouch and sling of the present invention.

FIG. **29** representatively illustrates a fully constructed pouch made from the component parts of FIG. **28**.

FIGS. **30** and **31** representatively illustrate side perspective views of the fully constructed pouch of FIG. **29** incorporated in a chassis that is partially severed to illustrate internal structure.

FIG. **32** representatively illustrates an exemplary test apparatus with a test pant loaded in a first configuration.

FIG. **33** representatively illustrates an exemplary test apparatus with a test pant loaded in a second configuration.

FIG. **34** representatively illustrates an exemplary test apparatus with a test pant loaded in a third configuration.

FIG. **35** representatively illustrates a top plan view of an exemplary absorbent insert of the present invention with portions cut away to illustrate underlying structure.

FIG. **36** representatively illustrates a cross sectional view of the absorbent insert of FIG. **35** taken along the line C-C.

FIG. **37** representatively illustrates a top plan view of the absorbent core of FIG. **35**.

FIG. **38** representatively illustrates a top plan view of another exemplary absorbent insert of the present invention with portions cut away to illustrate underlying structure.

FIG. **39** representatively illustrates a cross sectional view of the absorbent insert of FIG. **38** taken along the line D-D.

FIGS. **40-45** graphically represent the data of Tables 7, 8, and 9.

FIG. **46** representatively illustrates an exemplary pouch having a first exemplary positioning key.

FIG. **47** representatively illustrates an enlarged view of the encircled portion of FIG. **46**.

FIG. **48** representatively illustrates an exemplary pouch having a second exemplary positioning key.

FIG. **49** representatively illustrates an enlarged view of the encircled portion of FIG. **48**.

FIG. **50** representatively illustrates an exemplary pouch having a third exemplary positioning key.

FIG. **51** representatively illustrates an enlarged view of the encircled portion of FIG. **50**.

FIG. **52** representatively illustrates a top plan view of another exemplary absorbent insert of the present invention with portions cut away to illustrate underlying structure.

FIG. **53** representatively illustrates a cross-sectional view of the absorbent insert of FIG. **52** taken along the line E-E.

FIG. **54** representatively illustrates a cross-sectional view of the absorbent insert of FIG. **52** taken along the line F-F.

FIG. **55** representatively illustrates a top plan view of another exemplary absorbent insert of the present invention with portions cut away to illustrate underlying structure.

FIG. **56** representatively illustrates a top plan view of another exemplary absorbent insert of the present invention with portions cut away to illustrate underlying structure.

FIG. **57** representatively illustrates a cross-sectional view of the absorbent insert of FIG. **56** taken along the line G-G.

FIG. **58** representatively illustrates a side perspective view of an exemplary sling and absorbent insert incorporated in an exemplary chassis that is partially severed to illustrate internal structure.

DETAILED DESCRIPTION OF THE DRAWINGS

The containment pant of the present invention provides a durable outer chassis and an inner pouch for containing a disposable absorbent insert. In some embodiments, the containment pant is provided in a permanently closed condition. As used herein, the term "permanently closed" refers to a pant that is provided in a condition that is adapted to be only pulled on or pulled off like conventional underwear and is distinguished from pants that have refastenable fasteners and diapers that are provided in an open condition and include fasteners for securing the diapers around the body of the wearer. Suitable containment pants are also described in patent application U.S. Ser. No. 13/547,974, entitled "Containment Pant", filed on Jul. 12, 2012, and having attorney docket number 64816460US01, the entirety of which is incorporated herein by reference.

An exemplary containment pant of the present invention is representatively illustrated in FIGS. **1-3**. Specifically, FIG. **1** shows a side perspective view of a containment pant **10** having a chassis **12** and a sling **14** attached within the chassis **12**. The chassis **12** defines a waist opening **16** and a pair of leg openings **18**. The chassis **12** also defines a front waist region **20**, a back waist region **22**, and a crotch region **28**. The crotch region **28** is located between the front waist region **20** and the back waist region **22**. The containment pant **10** of FIG. **1** is depicted in FIGS. **2** and **3** with the chassis **12** partially severed to better illustrate internal elements. FIG. **2** representatively illustrates a side perspective view with the chassis **12** partially severed to better illustrate the positioning and construction of the sling **14** in the back of the containment pant **10**. FIG. **3** representatively illustrates a side perspective view with the chassis **12** partially severed to better illustrate the construction and positioning of the sling **14** in the front of the containment pant **10**. The containment pant **10** defines a longitudinal direction **48** and a transverse direction **50** as illustrated in FIG. **1**. The longitudinal direction **48** extends from the front waist region **20** through the crotch region **28** and into the back waist region **22**. The transverse direction **50** is perpendicular to the longitudinal direction **48**. The chassis **12** includes an outer shell **36** and may further include waist elastic, leg elastic, or both. Referring again to FIG. **1**, the chassis **12** is illustrated with a waist elastic **38** attached to the outer shell **36** and encircling the waist opening **16** and leg elastics **40** attached to the outer shell **36** and encircling each of the leg openings **18**.

Another exemplary containment pant of the present invention is representatively illustrated in FIGS. **6-8**. Specifically, FIG. **6** shows a side perspective view of a containment pant **11** having a chassis **12** and a sling **14** attached within the chassis **12**. The chassis **12** defines a waist opening **16** and a pair of leg openings **18**. The chassis **12** also defines a front waist region **20**, a back waist region **22**, and a crotch region **28**. The crotch region **28** is located between the front waist region **20** and the back waist region **22**. The containment pant **11** of FIG. **6** is depicted in FIGS. **7** and **8** with the chassis **12** partially severed to better illustrate internal elements. FIG. **7** representatively illustrates a side perspective view with the chassis **12** partially severed to better illustrate the positioning and construction of the sling **14** in the back of the containment pant **11**. FIG. **8** representatively illustrates a side perspective view with the chassis **12** partially severed to better illustrate the construction and positioning of the sling **14** in the front of the containment pant **11**. The containment pant **11** also defines a longitudinal direction **48** and a transverse direction **50** as illustrated in FIG. **6**. The chassis **12** includes an outer shell **37** and may further include a waist elastic **38** or leg elastics **40**, or both. Referring again to FIG. **6**, the chassis **12** is illustrated with a waist elastic **38** attached to the outer shell **37** and encircling the waist opening **16** and leg elastics **40** attached to the outer shell **37** and encircling each of the leg openings **18**.

In various embodiments, the outer shell may be made of a single piece of material or multiple pieces of material. In some embodiments, the outer shell may be made of two or more pieces of material. For example, FIG. **4** is a top plan view of the component pieces of the outer shell **36** of FIGS. **1-3**. The component pieces include a front component **21** and a back component **23**. In another example, FIG. **9** is a top plan view of the component pieces of the outer shell **37** of FIGS. **6-8**. The component pieces include a front component **24** and a back component **31**.

In various embodiments, the component pieces of the outer shell may be joined together in any suitable manner. For example, the front component **21** may be joined to the back component **23** at a crotch seam **29** as illustrated in FIG. **5**. FIG. **5** is a top plan view of the component pieces of the outer shell **36** partially joined together. In another example, the front component **24** may be joined to the back component **31** at a crotch seam **29** as illustrated in FIG. **10**. FIG. **10** is a top plan view of the component pieces of the outer shell **37** partially joined together. Additionally, one or both of the lateral side edges of the back component may be joined to one or both of the lateral side edges of the front component at one or more side seams to define a three-dimensional garment. Specifically, referring to FIG. **5**, the lateral side edges **25** of the back component **23** may be joined with the lateral side edges **27** of the front component **21** at side seams **26** to define the leg openings **18** and the waist opening **16** of the containment pant **10** as illustrated in FIG. **1**. Similarly, the lateral side edges **25** of the back component **31** of FIG. **10** may be joined with the lateral side edges **27** of the front component **24** at side seams **26** to define the leg openings **18** and the waist opening **16** of the containment pant **11** as illustrated in FIG. **6**.

In various embodiments, the side seams and/or the crotch seams may be formed using any suitable means such as ultrasonic bonding, thermal bonding, adhesive bonding, pressure bonding, sewing, and the like and combinations thereof. In some embodiments, the side seams and/or the crotch seam may be formed by sewing the component pieces of the outer shell using thread and any suitable stitch pattern or combination of patterns. In some embodiments, the side seams and/or crotch seams may be formed using a flatlock stitch.

In some embodiments, the present invention provides a first outer shell having a first overall shape and a second outer shell having a second overall shape that is different than the first overall shape. In some embodiments, the first outer shell shape may be adapted to the anatomy of a male wearer. In some embodiments, the second outer shell shape may be adapted to the anatomy of a female wearer. Customizing the first outer shell and/or the second outer shell is believed to be beneficial to allow for differences between the genders in anatomy, body shape, and undergarment style preferences. For example, the outer shell **36** illustrated in FIG. **1** has a shape and style adapted for males. In comparison, the outer shell **37** illustrated in FIG. **6** has a shape and style adapted for females. In some embodiments, the front components **21** may include protrusions **98** for partially defining the leg openings as illustrated in FIGS. **4** and **5**. Additionally, the back component **23** may also include protrusions **98** for partially defining the leg openings as illustrated in FIGS. **4** and **5**. In various embodiments, the front component may have an area that is similar in size to the area of the back component as illustrated in FIGS. **9** and **10**. In other embodiments, the front component may have an area that is significantly smaller than the area of the back component as illustrated in FIGS. **4** and **5**.

In various embodiments, the waist elastic may encircle at least 50, 60, 70, 80, or 90 percent of the respective waist opening. In some embodiments, the waist elastic **38** may encircle 100% of the waist opening **16** as representatively illustrated in FIGS. **1** and **6**. In various embodiments, the leg elastic may encircle at least 50, 60, 70, 80, or 90 percent of either or both leg openings. In some embodiments, the leg elastic **40** may encircle 100% of both leg openings **18** as representatively illustrated in FIGS. **1** and **6**.

In various embodiments, the waist elastic and/or the leg elastic may be in complete facing relationship with the outer shell (Not shown). In some embodiments, the waist elastic and/or the leg elastic may be partially or completely encased within the outer shell (Not shown). In other embodiments, the waist elastic and/or the leg elastic may be cantilevered relative to the outer shell. As used herein, the term "cantilevered" refers to a waist elastic and/or leg elastic that has less than 100% facing relationship with the outer shell and extends beyond an outer edge of the outer shell. For example, referring again to FIGS. **2** and **7**, the waist elastics **38** are cantilevered as they extend beyond the outer edge **46** of the respective outer shells **36** and **37**. Likewise, the leg elastics **40** are also cantilevered as they extend beyond the outer edge **46** of the respective outer shells **36** and **37**.

In various embodiments, the waist elastic and/or leg elastic may be joined with the outer shell using any suitable means such as ultrasonic bonding, thermal bonding, adhesive bonding, pressure bonding, sewing, and the like and combinations thereof. In some embodiments, the waist elastic and/or leg elastic may be sewed to the outer shell using thread and any suitable stitch pattern or combination of patterns. For example, FIGS. **1-3** and FIGS. **6-8** representatively illustrate the waist elastic **38** joined with the respective outer shells **36** and **37** at a sewn waist elastic seam **39** and the leg elastics **40** joined with the respective outer shells **36** and **37** at sewn leg elastic seams **41**. In some embodiments, the waist elastic and/or leg elastic may be sewed to the outer shell using a cover stitch.

Inside the chassis **12** is the sling **14**, which includes a fluid-impervious base sheet **30** and at least one containment flap **32** joined with the base sheet **30** to create a fluid-impervious pouch **34**. The fluid-impervious pouch **34** is adapted to house a removable absorbent insert and contain fluid until it can be taken into the absorbent insert. The fluid-impervious pouch **34** is drapeable and is designed to conform and gasket against the body of the wearer.

In some embodiments, the sling **14** may further include a first transition, a second transition, or both. The first transition and the second transition are believed to be beneficial in that they allow the fluid-impervious pouch to be joined within the chassis without significantly reducing the extension and retraction properties of the outer shell and/or the waist elastic. Additionally, the first transition and the second transition are believed to be beneficial by allowing the fluid-impervious pouch to move from front to back within the chassis. This freedom of movement is believed to allow the fluid-impervious pouch to adjust after donning the containment pant and during wear.

Referring again to FIGS. **2** and **7**, the sling **14** is illustrated with a second transition **42** joined with the back waist region **22** of the containment pant. Likewise, in FIGS. **3** and **8**, the sling **14** is illustrated with a first transition **44** joined with the front waist region **20** of the containment pant. Alternatively, in any of the embodiments described herein, the second transition may be joined with the front waist region and the first transition may be joined with the back waist region. In various embodiments, the first transition, the second transition, or both, may be one or more discrete pieces of material joined between the pouch and the chassis. In other embodiments, the first transition, the second transition, or both, may be integral with the pouch or may be integral with the shell or any suitable portion of the chassis.

For example, FIG. **3** illustrates the first transition **44** as integral with the shell components and FIG. **2** illustrates the second transition **42** as a discrete piece of material. In this embodiment, the first transition **44** is constructed from multiple portions of the shell **36**. As seen in FIGS. **4** and **5**, the first transition **44** is constructed from a first part **44**A, a second part **44**B, and a third part **44**C. The first part **44**A and the second part **44**B are integral with the back component **23** of the shell whereas the third part **44**C is integral with the front component **21** of the shell. When the shell is constructed, the first part **44**A and the second part **44**B are joined with the third part **44**C as illustrated by the arrows of FIG. **5**. The fully constructed first transition **44** is then folded along the fold lines **33** of FIG. **5** to define the first transition **44** as illustrated in FIG. **3**.

In another example, FIG. **8** also illustrates the first transition **44** as integral with the shell components and FIG. **7** illustrates the second transition **42** as a discrete piece of material. In this embodiment, the first transition **44** is constructed from a single portion of the shell **37**. As seen in FIGS. **9** and **10**, the first transition **44** is constructed from a portion of the front component **24** of the shell. When the shell is constructed, the first transition **44** is then folded along fold line **33** of FIG. **10** to define the first transition **44** as illustrated in FIG. **8**.

In various embodiments, a sling and a fluid-impervious pouch may be constructed in any suitable manner. For example, an exemplary sling and fluid-impervious pouch may include a containment flap, a base sheet, a first transition, and a second transition. Referring now to FIG. **11**, a top plan view of the component parts of an exemplary pouch and sling are representatively illustrated. A fully constructed pouch **68** made from the component parts of FIG. **11** is representatively illustrated in FIG. **12**. A fully constructed sling made from the component parts of FIG. **11** is representatively illustrated in FIG. **13**. A cross sectional view of the sling **52** of FIG. **13** taken along the line A-A is representatively illustrated in FIG. **14**.

Referring now to FIG. **11**, the component parts include a containment flap **54**, a base sheet **56**, a first transition **58**, and a second transition **60**. The containment flap **54** defines a proximal portion **62** and a distal portion **64**. The proximal portion **62** of the containment flap **54** is joined with the base sheet **56** to create a containment flap seal **66** and define a fluid-impervious pouch **68** as illustrated in FIG. **12**. In some embodiments, the containment flaps may further include one or more elastics. For example, as illustrated in FIG. **14**, the distal portion **64** of the containment flap **54** further includes a containment flap elastic **70**.

In various embodiments, the fluid-impervious pouch **68** of FIG. **12** may be incorporated into any suitable sling and/or chassis using integrated transitions, discrete transitions, or combinations thereof. In various embodiments, the fluid-impervious pouch **68** of FIG. **12** may be incorporated into any suitable sling and/or chassis using only a transition joined with the front waist region, only a transition joined with the back waist region, or neither. In FIG. **13** the fluid-impervious pouch **68** of FIG. **12** is joined with the first transition **58** and the second transition **60** to define the sling **52**. Referring now to FIGS. **11-13**, the first transition **58** defines a first edge **82** and a second edge **84**. Likewise, the second transition **60** defines a first edge **90** and a second edge **92**. The base sheet **56** defines a first edge **86** and a second edge **88**. The first edge **86** of the base sheet **56** is joined with the second edge **84** of the first transition **58** to define a first junction **72**. Likewise, the second edge **88** of the base sheet **56** is joined with the first edge **90** of the second transition **60** to define a second junction **74**.

In various embodiments, the sling **52** of FIG. **13** can be joined with any suitable chassis to form a containment pant. In various embodiments, the sling **52** may be joined with a chassis such that the first transition is located in either the front waist region or the back waist region of the chassis and the second transition is located in the opposite region of the chassis. For example, referring now to FIGS. **15** and **16**, an exemplary containment pant **53** having a chassis **51** and the sling **52** of FIG. **13** is representatively illustrated. FIG. **15** is a side perspective view of the containment pant **53** with the chassis **51** partially severed to illustrate the attachment of the sling **52** in the back waist region **22**. Specifically, the second transition **60** is joined with the back waist region **22** of the chassis **51** at a back sling seam **43**. FIG. **16** is a side perspective view of the containment pant **53** with the chassis **51** partially severed to illustrate the attachment of the sling **52** in the front waist region **20**. Specifically, the first transition **58** is joined with the front waist region **20** of the chassis **51** at a front sling seam **45**.

In some embodiments, a sling and a fluid-impervious pouch may be constructed with a first containment flap, a second containment flap, a base sheet, a first transition, and a second transition. For example, referring now to FIG. **17**, a top plan view of the component parts of another exemplary pouch and sling are representatively illustrated. A fully constructed pouch **118** made from some of the component parts of FIG. **17** is representatively illustrated in FIG. **18**. A fully constructed sling **102** made from the component parts of FIG. **17** is representatively illustrated in FIG. **19**. A cross sectional view of the sling **102** of FIG. **19** taken along the line B-B is representatively illustrated in FIG. **20**.

The component parts include a first side containment flap **104**, a second side containment flap **105**, a base sheet **106**, a first transition **108**, and a second transition **110**. The first side containment flap **104** and the second side containment flap **105** each define a proximal portion **112** and a distal portion **114**. The first transition **108** defines a first edge **132** and a second edge **134**. Likewise, the second transition **110** defines a first edge **140** and a second edge **142**. The base sheet **106** defines a first edge **136** and a second edge **138**. The first edge **136** of the base sheet **106** is folded along a first fold line **144** to define a first end containment flap **148** as illustrated in FIG. **18**. Likewise, the second edge **138** of the base sheet **106** is folded along a second fold line **146** to define a second end containment flap **150** as illustrated in FIG. **18**. The portion of the base sheet **106** proximate the first fold line **144** is joined with the second edge **134** of the first transition **108** to define a first junction **122** as illustrated in FIG. **19**. Likewise, the portion of the base sheet **106** proximate the second fold line **146** is joined with the first edge **140** of the second transition **110** to define a second junction **124** as illustrated in FIG. **19**.

In various embodiments, the side containment flaps may have a curve cut or a straight cut. For example, the first side containment flap **104** and the second side containment flap **105** of FIG. **17** are illustrated as having a curve cut. Similarly, the first side containment flap **330** and the second side containment flap **332** of FIG. **28** also illustrate a curve cut. In contrast, the containment flap **54** in FIG. **11** is exemplary of a straight cut flap. While not wishing to be bound by theory, it is believed that the curve cut containment flaps facilitate closer alignment with the natural curvature of the wearer's body. As such, it is believed that a more comfortable and better fit can be achieved.

The proximal portions **112** of each of the side containment flaps **104** and **105** are joined with the base sheet **106** and/or the first end containment flap **148** and/or the second end containment flap **150** to form containment flap seals **116** and to partially define a fluid-impervious pouch **118** as illustrated in FIG. **18**. In various embodiments, one or both end flaps may be positioned between one or both of the containment flaps and the base sheet. In other embodiments, one or both of the containment flaps may be positioned between one or both of the end flaps and the base sheet. For example, in some embodiments, both end flaps may be positioned between both containment flaps and the base sheet as illustrated in FIG. **18**. In other embodiments (not illustrated), both containment flaps may be positioned between both end flaps and the base sheet.

In various embodiments, the end flap may also include an end flap seal **117**. The end flap seal **117** may join the first side containment flap **104** and/or the second side containment flap **105** to the first end containment flap **148** and/or the second end containment flap **150** and/or the base sheet **106** to define the fluid impervious pouch **118** in conjunction with the containment flap seals **116**. In various embodiments, the overlap region **119** between the side containment flaps **104** and **105** and the end containment flaps **148** and **150** may be joined via any suitable manner to define a completely fluid impervious pouch **118**. For example, in some embodiments, the side containment flaps **104** and **105** may be joined with the end containment flaps **148** and **150** in the overlap regions **119** by adhesive bonding, stitching, ultrasonic bonding, thermal bonding, pressure bonding, and the like, and combinations thereof. For example, the distal portions **114** of the first side containment flap **104** and the second side containment flap **105** may be completely joined with the end containment flaps **148** and **150** in the overlap regions **119** to ensure that the pouch **118** is completely fluid-impervious.

In various embodiments, any or all of the side containment flaps and/or the end containment flaps may further include one or more elastics. For example, the distal portions **114** of the side containment flaps **104** and **105** may further include containment flap elastic **120** as illustrated in FIG. **20**.

In some embodiments, the first end containment flap and/or the second end containment flap may further include an insert stop that limits the depth to which an absorbent insert can be inserted. For example, the second end containment flap **150** of FIG. **18** is illustrated with an insert stop **147**. In this embodiment, the insert stop **147** is illustrated as an ultrasonic bond between the second end containment flap **150** and the base sheet **106**. In various embodiments, the insert stops may be any suitable length or width and may be positioned at any suitable depth within the first end containment pocket and/or the second end containment pocket. In some embodiments, the insert stop may extend from one containment flap seal to the other containment flap seal (not illustrated). In other embodiments, the insert stop **147** may terminate short of one or both containment flap seals **116** and thereby allow fluid within the second end containment pocket **150** to flow around the insert stop **147** and into a reservoir **145**. In effect, this configuration provides greater volume for containing insults while still providing a suitably sized pocket for retention of the absorbent insert.

In various embodiments, the fluid-impervious pouch **118** of FIG. **18** may be incorporated into any suitable sling and/or chassis using integrated transitions, discrete transitions, or combinations thereof. In various embodiments, the fluid-impervious pouch **118** of FIG. **18** may be incorporated into any suitable sling and/or chassis using only a transition joined with the front waist region, only a transition joined with the back waist region, or neither. In the illustrated embodiment, the fluid-impervious pouch **118** of FIG. **18** is joined with the first transition **108** and the second transition **110** to define the sling **102** of FIG. **19**.

In various embodiments, the sling **102** of FIG. **19** can be joined with any suitable chassis to form a containment pant. In various embodiments, the sling **102** may be joined with a chassis such that the first transition is located in either the front waist region or the back waist region of the chassis and the second transition is located in the opposite region of the chassis. For example, referring now to FIGS. **21** and **22**, an exemplary containment pant **103** having a chassis **101** and the sling **102** is representatively illustrated. FIG. **21** is a side perspective view of the containment pant **103** with the chassis **101** partially severed to illustrate the attachment of the sling **102** in the back waist region **22**. Specifically, the second transition **110** is joined with the back waist region **22** of the chassis **101** at a back sling seam **43**. FIG. **22** is a side perspective view of the containment pant **103** with the chassis **101** partially severed to illustrate the attachment of the sling **102** in the front waist region **20**. Specifically, the first transition **108** is joined with the front waist region **20** of the chassis **101** at a front sling seam **45**.

In another embodiment, a sling and a fluid-impervious pouch may be constructed with a base sheet, a first transition, and a second transition. For example, referring now to FIG. **23**, a top plan view of the component parts of another exemplary pouch and sling are representatively illustrated. A fully constructed pouch **206** made from some of the component parts of FIG. **23** is representatively illustrated in FIG. **24**. A fully constructed sling **152** made from the component parts of FIG. **23** is representatively illustrated in FIG. **25**. The component parts include a base sheet **154**, a first transition **156**, and a second transition **158**. The base sheet **154** includes a first arm **160**, a second arm **162**, a third arm **164**, and a fourth arm **166**. The base sheet **154** defines an absorbent facing surface **168** and a chassis facing surface **170**.

Referring now to FIGS. **23** and **24**, the first arm **160** and the second arm **162** are folded towards the absorbent facing surface **168** of the base sheet **154** in the direction indicated by arrows **172**. A distal portion **174** of the first arm **160** is joined with a distal portion **176** of the second arm **162** to define a first bridging seam **178**. Likewise, the third arm **164** and the fourth arm **166** are folded towards the absorbent facing surface **168** of the base sheet **154** in the direction indicated by arrows **180**. A distal portion **182** of the third arm **164** is joined with a distal portion **184** of the fourth arm **166** to define a second bridging seam **186**. An inner portion **188** of the first arm **160** is joined with a first portion **190** of the base sheet **154** to define a portion of a first containment seam **194**. Likewise, an inner portion **192** of the second arm **162** is joined with the first portion **190** of the base sheet **154** to define the remainder of the first containment seam **194**. An inner portion **196** of the third arm **164** is joined with a second portion **198** of the base sheet **154** to define a portion of a second containment seam **200**. Likewise, an inner portion **202** of the fourth arm **166** is joined with the second portion **198** of the base sheet **154** to define the remainder of the second containment seam **200**.

By folding the first arm **160** and the second arm **162** in the direction indicated by arrows **172**, the lateral side edges **204** of the base sheet **154** tend to bend towards the absorbent facing surface **168** of the base sheet **154**. Similarly, by folding the third arm **164** and the fourth arm **166** in the direction indicated by arrows **180**, the lateral side edges **204** of the base sheet **154** tend to bend in the same manner to define containment flap **205**. As such, the base sheet **154** is cupped to define a fluid-impervious pouch **206** having containment flap **205** as illustrated in FIG. **24**.

In various embodiments, the fluid-impervious pouch **206** of FIG. **24** may be incorporated into any suitable sling and/or chassis using integrated transitions, discrete transitions, or combinations thereof. In various embodiments, the fluid-impervious pouch **206** of FIG. **24** may be incorporated into any suitable sling and/or chassis using only a transition joined with the front waist region, only a transition joined with the back waist region, or neither. In the illustrated embodiment, the fluid-impervious pouch **206** is joined with the first transition **156** and the second transition **158** to define the sling **152** as illustrated in FIG. **25**. In this embodiment, the first transition **156** defines a first edge **210** and a second edge **212** and the second transition **158** defines a first edge **214** and a second edge **216**. The first portion **190** of the base sheet **154** is joined with the second edge **212** of the first transition **156** to define a first junction **218**. Likewise, the second portion **198** of the base sheet **154** is joined with the first edge **214** of the second transition **158** to define a second junction **220**. In some embodiments, the fluid-impervious pouch **206** may define a distal edge and may include one or more elastics. For example, as illustrated in FIG. **24**, the distal edge **208** of the pouch **206** further includes a pouch elastic **209**.

In various embodiments, the sling **152** of FIG. **25** can be joined with any suitable chassis to form a containment pant. In various embodiments, the sling **152** may be joined with a chassis such that the first transition is located in either the front waist region or the back waist region of the chassis and the second transition is located in the opposite region of the chassis. For example, referring now to FIGS. **26** and **27**, an exemplary containment pant **153** having a chassis **151** and the sling **152** is representatively illustrated. FIG. **26** is a side perspective view of the containment pant **153** with the chassis **151** partially severed to illustrate the attachment of the sling **152** in the back waist region **22**. Specifically, the second transition **158** is joined with the back waist region **22** of the chassis **151** at a back sling seam **43**. FIG. **27** is a side perspective view of the containment pant **153** with the chassis **151** partially severed to illustrate the attachment of the sling **152** in the front waist region **20**. Specifically, the first transition **156** is joined with the front waist region **20** of the chassis **151** at a front sling seam **45**.

In another embodiment, a fluid-impervious pouch may be constructed with a first containment flap, a second containment flap, a third containment flap, a fourth containment flap, and a base sheet. For example, referring now to FIG. **28**, a top plan view of the component parts of another exemplary pouch are representatively illustrated. A fully constructed pouch **346** made from the component parts of FIG. **28** is representatively illustrated in FIG. **29**.

The component parts include a first side containment flap **330**, a second side containment flap **332**, a first end containment flap **334**, a second end containment flap **336**, and a base sheet **338**. The containment flaps **330**, **332**, **334**, and **336** each define a proximal portion **340** and a distal portion **342**.

The proximal portions **340** of each of the containment flaps **330**, **332**, **334**, and **336** are joined with the base sheet **338** to form containment flap seals **344** and to define a fluid-impervious pouch **346** as illustrated in FIG. **29**. In various embodiments, one or both end flaps may be positioned between one or both of the containment flaps and the base sheet. In other embodiments, one or both of the containment flaps may be positioned between one or both of the end flaps and the base sheet. For example, in some embodiments, both end flaps may be positioned between both containment flaps and the base sheet as illustrated in FIG. **29**. In other embodiments (not illustrated), both containment flaps may be positioned between both end flaps and the base sheet.

In various embodiments, the overlap region **349** between the side containment flaps **330** and **332** and the end containment flaps **334** and **336** may be joined together via any suitable manner to at least partially define the completely fluid impervious pouch **346**. For example, in some embodiments, the side containment flaps **330** and **332** may be joined with the end containment flaps **334** and **336** in the overlap regions **349** by adhesive bonding, stitching, ultrasonic bonding, thermal bonding, pressure bonding, and the like, and combinations thereof. For example, the distal portions **342** of the first side containment flap **330** and the second side containment flap **332** may be completely joined with the end containment flaps **334** and **336** in the overlap regions **349** to ensure that the pouch **346** is completely fluid-impervious. In other embodiments, the distal portions of the first end containment flap and the second end containment flap may be completely joined with the side containment flaps in the overlap region to ensure the pouch is completely fluid-impervious (not shown).

In various embodiments, one or more of the containment flaps may further include one or more elastics. For example, the distal portions **342** of the containment flaps **330**, **332**, **334**, and **336** may further include containment flap elastic **345**. In various embodiments, the fluid-impervious pouch **346** of FIG. **29** may be incorporated into any suitable sling and/or chassis using integrated transitions, discrete transitions, or combinations thereof. In various embodiments, the fluid-impervious pouch **346** of FIG. **29** may be incorporated into any suitable sling and/or chassis using only a transition joined with the front waist region, only a transition joined with the back waist region, or neither.

Referring now to FIGS. **30** and **31**, the fluid-impervious pouch **346** of FIG. **29** is joined with a first transition **350** and a second transition **352** to define a sling **348** suspended within an exemplary containment pant **354**. In various embodiments, the pouch **346** can be joined within any suitable chassis to form a containment pant. In various embodiments, the pouch **346** may be joined with a chassis via a first transition that is located in either the front waist region or the back waist region of the chassis and via a second transition that is located in the opposite region of the chassis. FIG. **30** is a side perspective view of the containment pant **354** with the chassis **353** partially severed to illustrate the attachment of the pouch **346** in the back waist region **22** via the second transition **352**. The second transition **352** is joined with the back waist region **22** of the chassis **353** at a back sling seam **43**. FIG. **31** is a side perspective view of the containment pant **354** with the chassis **353** partially severed to illustrate the attachment of the pouch **346** in the front waist region **20** via the first transition **350**. In the illustrated embodiment, the first transition **350** is a discrete piece of material joined with the front waist region **20** of the chassis **353** while the second transition **352** is a discrete piece of material joined with the back waist region **22** of the chassis **353**.

In general, any of the containment flaps described herein, may further include one or more containment flap elastics. The containment flap elastics may be joined with the containment flaps in any suitable configuration using any suitable attachment means. For example, in some embodiments, the containment flap elastics may be joined with the containment flaps using mechanical encasement, adhesive bonding, thermal bonding, ultrasonic bonding, pressure bonding, sewing, or the like, or combinations thereof.

In some embodiments, the containment flap elastic may be encased, at least partially, within a channel formed by folding a portion of the containment flap. For example, FIG. **14** representatively illustrates a cross sectional view of the sling **52** of FIG. **13** taken along the line A-A. In this embodiment, the proximal portion **62** of the containment flap **54** is bonded to the base sheet **56** to form containment flap seals **66**. The distal portion **64** of the containment flap **54** is folded over upon itself and bonded to itself to form a channel **71**. The containment flap elastic **70** is encased within the channel **71** and may be partially attached to the containment flap **54**. In other embodiments, the containment flap elastic may be disposed within the channel but not attached to the containment flap.

In some embodiments, the containment flap elastic may be folded over the distal edge of the containment flap. For example, FIG. **20** representatively illustrates a cross sectional view of the sling **102** of FIG. **19** taken along the line B-B. In this embodiment the proximal portion **112** of the containment flaps **104** and **105** are bonded to the base sheet **106** to form containment seals **116**. The containment flap elastic **120** is folded over the distal edge **121** of the first side containment flap **104** and the second side containment flap **105**. The containment flap elastics **120** may be joined with the side containment flaps **104** and **105** by any suitable method, such as sewing.

In various embodiments, the attachment of the containment flap elastic to the containment flap can be adjusted to vary the tension in the containment flap. For example, in some embodiments, the containment flap elastic may be applied at a uniform tension and select portions can be deadened to provide a containment flap elastic having variable tension along the length of the containment flap. In some embodiments, the containment flap elastic may be applied at variable tension to provide a containment flap elastic having variable tension along the length of the containment flap.

In various embodiments, the containment flaps may be integral with the base sheet. For example, the containment flap **205** illustrated in FIG. **24** is integral with the base sheet **154**. In other embodiments, the containment flaps may be discrete pieces of material that are joined with the base sheet using any suitable method to at least partially define the pouch. For example, the containment flap **54** illustrated in FIG. **12** is discrete from and joined with the base sheet **56** at the containment flap seal **66**. In some embodiments, one or more containment flaps may be integral with the base sheet and one or more of containment flaps may be discrete pieces. For example, FIG. **18** illustrates the first end containment flap **148** and the second end containment flap **150** being integral with the base sheet **106** while the first side containment flap

104 and second side containment flap **105** are discrete from and joined with the base sheet **106** at the containment flap seals **116**.

In various embodiments, the discrete containment flaps may be joined with the base sheet in any suitable manner. For example, the containment flaps may be sewed to the base sheet, heat bonded, adhesively bonded, ultrasonically bonded, seam taped, or the like, or combinations thereof. In embodiments wherein the pouch is fluid-impervious, the discrete containment flaps are joined to the base sheet to provide a fluid-impervious seal. The fluid-impervious seal is believed to prevent leakage from the pouch until the absorbent insert is able to intake the fluid.

In some embodiments, the fluid-impervious seal is created, at least in part, using ultrasonic bonding. Ultrasonic bonding fuses the base sheet material to the containment flap material. The ultrasonic bonding may utilize any suitable bonding pattern to regulate the bond strength of the seal. For example, the ultrasonic bond pattern may be one or more rows of "dash" bonds. For example, in some embodiments, the bond pattern may include three rows of offset dash bonds like illustrated in FIG. **13**. In other embodiments, the ultrasonic bond pattern may include one or more continuous "wave" bond patterns. For example, in some embodiments, the bond pattern may include a single continuous wave bond pattern as illustrated in FIG. **18**. In other embodiments, the ultrasonic bond pattern may include one or more rows of "dot" bonds. For example, in some embodiments, the bond pattern may include two rows of offset dot bonds as illustrated in FIG. **24**. The ultrasonic bonding may be accomplished using a standard ultrasonic horn and anvil. In some embodiments, the ultrasonic bonds may be created using a sonic sewing machine. A suitable machine is available from Sonobond and has model number LM920. In various embodiments, the Sonobond sonic sewing machine may have an output setting of 7.5, an anvil speed of 2, and a horn speed of 2.

The use of ultrasonic bonding is believed to be beneficial in some embodiments over sewing because no holes are created in the containment flap and thus the integrity of the pouch is preserved. Likewise, the use of ultrasonic bonding is believed to be beneficial in some embodiments over seam tape because the base sheet and/or containment flaps could melt at the application temperature of typical seam tape. In some embodiments, the base sheet is made of a polyurethane and polyester laminate and the containment flaps are made of a polyurethane and polyester laminate. In these embodiments, the base sheet and the containment flap can be constructed with ultrasonic bonding to create a strong seal without burning through either the base sheet or the containment flap.

The flap seals collectively define a flap seal perimeter. The portion of the base sheet circumscribed by the flap seal perimeter constitutes the pouch floor. For example, referring now to FIG. **29**, the containment flaps **330**, **332**, **334**, and **336** are joined to the base sheet **338** at the flap seals **344** and define a flap seal perimeter **356**. The location on the base sheet **338** where the flap seal perimeter **356** will be formed is shown with a dashed line on FIG. **28** for purposes of illustration. In general, the portion of the base sheet **338** circumscribed by the flap seal perimeter **356** constitutes the pouch floor **358**. The pouch floor **358** defines a pouch floor length **360**, a pouch floor width **362**, and a pouch floor area **364**.

In any of the embodiments disclosed herein, one or more of the containment flaps may further include an absorbent insert stop. The absorbent insert stop may be any suitable physical barrier that limits the depth of insertion of the absorbent insert into one or more of the containment flaps. In various embodiments the absorbent insert stop may be a mechanical bond between the containment flap and the base sheet oriented primarily in the transverse direction. The mechanical bond may be an ultrasonic bond, a thermal bond, a stitched bond, a pressure bond, an adhesive bond, or the like, or a combination thereof. For example, referring now to FIG. **29**, the second end containment flap **336** is illustrated with an absorbent insert stop **351**. In this embodiment, the absorbent insert stop **351** is illustrated as an ultrasonic bond that limits the depth of insertion of the absorbent insert into the second end containment flap **336**. In another example, the second end containment flap **150** of FIG. **18** is illustrated with an insert stop **147** that is an ultrasonic bond between the second end containment flap **150** and the base sheet **106**.

In embodiments having one or more absorbent insert stops, the pouch floor length and the pouch floor area are defined in part by the containment flap seal and in part by the absorbent insert stop. For example, referring again to FIG. **28**, the location on the base sheet **338** where the absorbent insert stop **351** will be formed is shown with a dashed line for purposes of illustration. In embodiments with the absorbent insert stop **351**, the pouch floor **358** defines a pouch floor length **361** and a pouch floor area **365**. In these embodiments, the pouch floor length **361** is defined by the end portion **355** of the containment flap seal **344** and the absorbent insert stop **351**. Likewise, the pouch floor area **365** is defined by the absorbent insert stop **351** and the side portions **357** of the containment flap seal **344** up to the points where the absorbent insert stop **351**, if extended, would intersect the containment flap seal **344**.

In embodiments that include one or more absorbent insert stops, the pouch floor may also define a reservoir portion that extends between the absorbent insert stop and the containment flap seal under a containment flap. For example, referring again to FIGS. **28** and **29**, the pouch floor **358** defines a reservoir portion **359** that extends from the absorbent insert stop **351** to the end portion **363** of the containment flap seal **344**. In another example, referring now to FIG. **18**, the pouch **118** includes a reservoir portion **145** that extends from the absorbent insert stop **147** to the end flap seal **117**. As discussed previously, the insert stops may be any suitable length or width and may be positioned at any suitable depth within the first end containment pocket and/or the second end containment pocket. In some embodiments, the absorbent insert stops may terminate short of one or both containment flap seals and thereby allow fluid within the containment pocket to flow around the absorbent insert stop and into the reservoir portion. In various embodiments, the reservoir portion may have a length of about 50 to 70 mm or about 60 mm.

In any of the embodiments disclosed herein, one or more of the pouches may further include one or more containment flaps which may include one or more positioning keys. As used herein, the term "positioning key" refers to any physical structure created within a pouch that is adapted to engage and align with a positioning notch of a discrete absorbent insert positioned within the pouch and that is adapted to be at least partially surrounded by portions of the discrete absorbent insert. The positioning keys are believed to aid orientation and alignment of the discrete absorbent insert relative to the pouch during insertion of the absorbent insert. Additionally, the positioning keys are believed to minimize shifting of the absorbent insert relative to the fluid impervious pouch during use.

In various embodiments a positioning key may be a mechanical bond formed between a containment flap and the base sheet. The mechanical bond may be an ultrasonic bond, a thermal bond, a stitched bond, a pressure bond, an adhesive bond, or the like, or combinations thereof. In some embodiments, a positioning key may be a discrete piece of material joined between a containment flap and the base sheet. The discrete piece of material may be joined by ultrasonic bonding, thermal bonding, stitching, pressure bonding, adhesive bonding, and the like, and combinations thereof. In some embodiments, a positioning key may be a combination of mechanical bonds and discrete pieces of material. In some embodiments, the positioning keys may be projections from the base sheet extending towards the containment flap but not joining thereto. In some embodiments, the positioning keys may be projections from the containment flap extending towards the base sheet but not joining thereto. In various embodiments, the projections may be an integral portion of the containment flap or the base sheet. In some embodiments, the projections may be a discrete piece of material joined with the containment flap and/or the base sheet by any suitable means. In some embodiments, the positioning keys may be any combination of those described above.

Referring now to FIG. **46**, a perspective view of an exemplary pouch **402** with a first positioning key **404** and a second positioning key **406** is representatively illustrated. The exemplary pouch **402** is similar in construction to the pouch **346** illustrated in FIG. **29** but with the addition of the first positioning key **404** and the second positioning key **406**. However, in various embodiments, the exemplary positioning key **404** and/or the exemplary positioning key **406** may be incorporated into any of the pouches described herein.

The first positioning key **404** is formed by bonding a portion of the first end containment flap **334** with a portion of the base sheet **338**. Likewise, the second positioning key **406** is formed by bonding a portion of the second end containment flap **336** to a portion of the base sheet **338**. To better illustrate the detail of the exemplary first positioning key, an encircled portion **408** of FIG. **46** is illustrated in FIG. **47**. Specifically, FIG. **47** is a magnified perspective view of the first end containment flap **334** joined with the base sheet **338** via a first bond **410** to define the first positioning key **404**. The first end containment flap **334** and the base sheet **338** define a first end containment flap entrance **412** having an entrance width **414** as measured in the transverse direction **50**. The first positioning key **404** has a first positioning key bond width **416** which separates the first end containment flap entrance **412** into a first sub-width **418** and a second sub-width **420**. The first sub-width **418** is measured in the transverse direction **50** along the distal portion **342** of the first end containment flap **334** from the first side containment seal **344** to the first bond **410**. Likewise, the second sub-width **420** is measured in the transverse direction **50** along the distal portion **342** of the first end containment flap **334** from the first bond **410** to the second side containment seal **344**. In embodiments that do not include side containment seals, the widths and sub-widths are measured from a point 30 mm from the distal edge of the side containment flap.

The first end containment flap **334** and the base sheet **338** also define a first end containment flap depth **422** as measured in the longitudinal direction **48** from the distal edge **343** to the end containment seal **344**. In embodiments having an absorbent insert stop, the containment flap depth is measured in the longitudinal direction from the distal edge of the containment flap to the absorbent insert stop. The first positioning key **404** defines a key depth and a key length **426**. The key depth is measured in the longitudinal direction **48** from the distal edge **343** to the first bond **410**. In this embodiment, the key depth is equal to zero because the first bond **410** extends to the distal edge **343**. The key length **426** is measured in the longitudinal direction **48** from one edge of the first bond **410** to a second edge of the first bond **410**. In various embodiments, the positioning key **404** and/or the fluid-impervious pouch **402** of FIG. **46** may be incorporated into any suitable sling and/or chassis as described herein.

In some embodiments, a portion of one or more of the containment flaps may be pleated in conjunction with the formation of the one or more positioning keys. For example, as illustrated in FIG. **48**, a perspective view of an exemplary pouch **428** with a first positioning key **430** and a second positioning key **432** is representatively illustrated. The exemplary pouch **428** is similar in construction to the pouch **346** illustrated in FIG. **29** but with the addition of the first positioning key **430** and the second positioning key **432**. However, in various embodiments, the exemplary positioning key **430** and/or the exemplary positioning key **432** may be incorporated into any of the pouches described herein.

The first positioning key **430** is formed by bonding a portion of the first end containment flap **334** with a portion of the base sheet **338**. Likewise, the second positioning key **432** is formed by bonding a portion of the second end containment flap **336** to a portion of the base sheet **338**. To better illustrate the detail of this exemplary positioning key, an encircled portion **433** of FIG. **48** is illustrated in FIG. **49**. Specifically, FIG. **49** is a magnified perspective view of the first end containment flap **334** joined with the base sheet **338** via a first bond **410** to partially define the first positioning key **430**. Additionally, the first end containment flap **334** is also joined to itself at first pleat bond **434** to further define the first positioning key **430**. The first end containment flap **334** and the base sheet **338** define a first end containment flap entrance **412** having an entrance width **414** as measured in the transverse direction **50**. The first positioning key **430** has a first positioning key bond width **435** which separates the first end containment flap entrance **412** into a first sub-width **418** and a second sub-width **420**. The first sub-width **418** is measured in the transverse direction **50** along the distal portion **342** of the first end containment flap **334** from the first side containment seal **344** to a first side of the first bond **410**. Likewise, the second sub-width **420** is measured in the transverse direction **50** along the distal portion **342** of the first end containment flap **334** from a second side of the first bond **410** to the second side containment seal **344**.

The first end containment flap **334** and the base sheet **338** also define a first end containment flap depth **422** as measured in the longitudinal direction **48** from the distal edge **343** to the end containment seal **344**. The first positioning key **430** defines a key depth and a key length **426**. The key depth is measured in the longitudinal direction **48** from the distal edge **343** to the first bond **410**. In this embodiment, the key depth is equal to zero because the first bond **410** extends to the distal edge **343**. The key length **426** is measured in the longitudinal direction **48** from one edge of the first bond **410** to a second edge of the first bond **410**. In various embodiments, the fluid-impervious pouch **428** and/or the positioning key **430** of FIG. **48** may be incorporated into any suitable sling and/or chassis as described herein.

In some embodiments, a portion of one or more of the containment flaps may be joined with a portion of the base sheet via a discrete piece of material to define one or more positioning keys. For example, as illustrated in FIG. **50**, a perspective view of an exemplary pouch **436** with a first positioning key **438** and a second positioning key **440** is representatively illustrated. The exemplary pouch **436** is similar in construction to the pouch **346** illustrated in FIG. **29** but with the addition of the first positioning key **438** and the second positioning key **440**. However, in various embodiments, the exemplary positioning key **438** and/or the exemplary positioning key **440** may be incorporated into any of the pouches described herein.

The first positioning key **438** is formed by bonding a portion of the first end containment flap **334** with a first end of a first discrete piece of material **442** and bonding a portion of the base sheet **338** with a second end, opposite the first end, of the first discrete piece of material **442**. Likewise, the second positioning key **440** is formed by bonding a portion of the second end containment flap **336** with a first end of a second discrete piece of material **444** and bonding a portion of the base sheet **338** with a second end, opposite the first end, of the second discrete piece of material **444**.

To better illustrate the detail of this exemplary positioning key, an encircled portion **446** of FIG. **50** is illustrated in FIG. **51**. Specifically, FIG. **51** is a magnified perspective view of the first end containment flap **334** joined with the base sheet **338** via a first discrete piece of material **442** to define the first positioning key **438**. The first discrete piece of material **442** is bonded to the first end containment flap **334** at a first bond **448**. Likewise, the first discrete piece of material **442** is bonded to the base sheet **338** at a second bond **450**.

The first end containment flap **334** and the base sheet **338** define a first end containment flap entrance **412** having an entrance width **414** as measured in the transverse direction **50**. The first positioning key **438** has a first positioning key width **452** which separates the first end containment flap entrance **412** into a first sub-width **418** and a second sub-width **420**. The first sub-width **418** is measured in the transverse direction **50** along the distal portion **342** of the first end containment flap **334** from the first side containment seal **344** to a first side of the first discrete piece of material **442**. Likewise, the second sub-width **420** is measured in the transverse direction **50** along the distal portion **342** of the first end containment flap **334** from a second side of the first discrete piece of material **442** to the second side containment seal **344**.

The first end containment flap **334** and the base sheet **338** also define a first end containment flap depth **422** as measured in the longitudinal direction **48** from the distal edge **343** to the end containment seal **344**. The first positioning key **438** defines a key depth **424** and a key length **426**. The key depth **424** is measured in the longitudinal direction **48** from the distal edge **343** to the first discrete piece of material **442**. In this embodiment, the key depth **424** is equal to 5 mm as the first discrete piece of material **442** is slightly removed from the distal edge **343**. The key length **426** is measured in the longitudinal direction **48** from one edge of the first discrete piece of material **442** to a second edge of the first discrete piece of material **442**. In various embodiments, the fluid-impervious pouch **436** of FIG. **50** may be incorporated into any suitable sling and/or chassis as described herein.

In various embodiments, the total width of the various containment flap entrances is measured in the transverse direction **50** along the distal portion **342** of the respective containment flaps from a first side containment seal to a second side containment seal. For example, referring again to FIGS. **46**, **48**, and **50**, the containment flap width **414** is measured from points A to points B. In various embodiments, the flap entrance width may be 160 to 200 mm, 165 to 180 mm, or about 165 mm.

In various embodiments, the width of the positioning key is measured in the transverse direction **50** from a first side of the respective positioning key to a second side of the respective positioning key. In general, the width of the positioning key is the minimum dimension required to span the positioning key in the transverse direction without deforming the positioning key. For example, referring again to FIG. **47**, the positioning key width **416** is measured from point C to point D. In the example illustrated in FIG. **49**, the positioning key width **435** is measured from point E to point F. In the example illustrated in FIG. **51**, the positioning key width **452** is measured from point G to point H. In various embodiments, the key width may be 1 to 10 mm, 3 to 7 mm, or about 6 mm.

In general, the respective entrance widths are separated by the positioning key to define sub-widths. The sub-widths are measured in the transverse direction **50** from a containment flap seal to the respective side of the positioning key. In general, the sub-width is the maximum dimension that can pass between the containment flap seal and the positioning key without deforming the positioning key or other elements of the pouch. For example, referring again to FIGS. **46** and **47**, the first sub-width **418** is measured from point A to point C and the second sub-width **420** is measured from point D to point B. In the example illustrated in FIGS. **48** and **49**, the first sub-width **418** is measured from point A to point E and the second sub-width **420** is measured from point F to point B. In the example illustrated in FIGS. **50** and **51**, the first sub-width **418** is measured from point A to point G and the second sub-width **420** is measured from point H to point B.

In embodiments, having multiple positioning keys, the respective entrance widths may be separated to define a third sub-width, a fourth sub-width, etc. In various embodiments, the sub-widths may be 70 to 100 mm, 80 to 90 mm, or about 83 mm. In various embodiments, the first sub-width may be 90 to 110% the second sub-width. In some embodiments, the first sub-width may be about 100% the second sub-width. In these embodiments, the positioning key is essentially centered within the entrance width.

In general, the containment flap depth **422** is measured in the longitudinal direction **48** from the distal edge of the respective flap to the end containment seal or the absorbent insert stop of the respective flap. In various embodiments, the containment flap depth may be 30 to 60 mm, 35 to 50 mm, or about 40 mm.

In general, the positioning key depth is the distance, as measured in the longitudinal direction **48**, from the distal edge of the containment flap to the portion of the positioning key closest to the distal edge. In various embodiments, the positioning key depth can be characterized as a percentage of the containment flap depth. As such, the positioning key depth can range from 0% to 90% the containment flap depth. In other words, at 0%, at least a portion of the positioning key is located proximate the distal edge of the containment flap. In some embodiments, one or more containment flaps may include a positioning key having a positioning key depth that is less than 25%, less than 15%, or less than 5% the respective containment flap depth.

Similarly, the positioning key length is the distance, as measured in the longitudinal direction **48**, from the portion of the positioning key closest to the distal edge of the respective containment flap to the portion of the positioning key furthest from the distal edge of the respective containment flap. In various embodiments, the positioning key length can be characterized as a percentage of the containment flap depth. As such, the positioning key length can range from 1% to 100% the containment flap depth. In other words, at 1%, the positioning key length is essentially a point bond. Similarly, at 100%, the positioning key is attached along the entire depth of the containment flap.

In various embodiments, the positioning keys may have one or more fluid passageways that allow fluid to move in the transverse direction through the positioning key. For example, referring again to FIG. **51**, the positioning key **438** is illustrated with fluid passageways **454** in the form of holes. In various embodiments, the positioning keys may have one or more fluid passageways in any suitable shape and size. For example, the fluid passageways may be holes, slits, or other openings that allow fluid to move in the transverse direction through the positioning key, or combinations thereof. In embodiments, wherein the positioning key length is at least 50% the containment flap depth, the utilization of one or more fluid passageways is believed to be useful in allowing fluid to access all parts of the absorbent insert.

Referring again to FIG. **28**, the pouch floor **358** also defines a first end section **366**, a second end section **367**, and a central section **368** in the longitudinal direction **48**. The central section **368** extends between the first end section **366** and the second end section **367**. The first end section **366** defines a first end section width **369** and a first end section length **370**. The second end section **367** defines a second end section width **371** and a second end section length **372**. The central section **368** defines a central section width **373** and a central section length **374**. The first end section length **370** plus the second end section length **372** plus the central section length **374** equals the pouch floor length. The widths of the various sections are measured in the transverse direction **50** and the lengths of the various sections are measured in the longitudinal direction **48**. The pouch floor dimensions are measured on an assembled pouch by tracing around the inner edge of the flap seal perimeter with a pen, cutting the containment flaps and elastic from the pouch, and laying the pouch floor flat. If no flap seal is present, the pouch floor is defined relative to the distal edge of the containment flap. Specifically, in these embodiments, the pouch floor is defined by the position 30 mm from the distal edge of the containment flap.

In an embodiment adapted for children weighing 60 to 120 pounds, which may be characterized as size large and/or extra large, the pouch floor length may be 380 to 500 mm, or 410 to 470 mm, or about 440 mm. In an embodiment adapted for children weighing 38 to 65 pounds, which may be characterized as small and/or medium, the pouch floor length may be 350 to 450 mm, 375 to 425 mm, or about 400 mm. In some of these embodiments, the pouch floor may also include a reservoir having a length of 50 to 70 mm or about 60 mm.

In various embodiments, the first end section length may equal the central section length which may equal the second end section length. In other embodiments, the first end section length may equal the second end section length and the central section length may be different. For example, the first end section length may be about 35% the pouch floor length, the second end section length may be about 35% the pouch floor length, and the central section length may be about 30% the pouch floor length. In another example, the first end section length may be about 30% the pouch floor length, the second end section length may be about 30% the pouch floor length, and the central section length may be about 40% the pouch floor length.

In various embodiments, the pouch floor may have a width that varies at different points along the longitudinal direction. For example, as illustrated in FIG. **28**, the pouch floor **358** has a variable width at different points along the longitudinal direction. In this embodiment, the first end section **366** and the second end section **368** have a maximum width that is greater than the maximum width of the central section **367**. For example, the first end section and the second end section may have a maximum width of about 145 to 195 mm, about 160 to 180 mm or about 171 mm. In these embodiments, the central section may have a maximum width of about 60 to 100, about 70 to 90 mm, or about 82 mm.

In various embodiments, the first end section, the second end section, and/or the central section may have a variable width at different points along the longitudinal direction or may have a consistent width at different points along the longitudinal direction. In some embodiments, the first end section and the second end section may have variable width at different points along the longitudinal direction and the central section may have a consistent width at different points along the longitudinal direction as illustrated in FIG. **28**. In some embodiments, the first end section and the second end section may have a width that varies from 171 mm at the maximum to 82 mm at the minimum. In these embodiments, the central section may have a consistent width of about 82 mm.

In some embodiments, the pouch floor defines a first reference width **376** measured at ⅛ the pouch floor length, a second reference width **377** measured at ½ the pouch floor length, and a third reference width **378** measured at ⅞ the pouch floor length. In some embodiments, the first reference width **376** may be equal to the third reference width **378** and the second reference width **377** may be less than the first and third reference widths **376** and **378**. In some embodiments, the second reference width **377** may be less than 50%, 60%, 70%, or 80% the first reference width **376** and/or the third reference width **378**. In some embodiments, the second reference width **377** may be about 48% the first reference width **376** and the third reference width **378**.

In various embodiments, the pouch floor area may be any suitable value. For example, in embodiments adapted for children weighing 60 to 120 pounds, the pouch floor area may be about 55,000 mm^2. In embodiments adapted for children weighing 38 to 65 pounds, the pouch floor area may be about 47,700 mm^2.

In various embodiments, the pouch floor may define any suitable shape. For example, the pouch floor may have a symmetric shape about the transverse centerline or may have an asymmetric shape about the transverse centerline. In various embodiments, the pouch floor may have a dog-bone-shape, hourglass-shape, T-shape, rectangular shape, or the like.

In various embodiments, the pouches of the present invention may be joined with one or more transitions in any suitable manner. For example, the pouches may be joined with the transitions by sewing, ultrasonic bonding, thermal bonding, adhesive bonding, seam taping, and the like, and combinations thereof. In some embodiments, the transitions may be joined with the pouches by sewing, using any suitable stitch or combination of stitches. For example, in some embodiments, the transitions may be attached to the pouches using a single needle stitch followed by a top stitch.

In some embodiments, the pouches may be constructed such that extra material is available for attaching the transitions without breaching the fluid-impervious integrity of the pouch. For example, in some embodiments, the containment flap may be joined to the base sheet at the containment flap seal. The containment flap seal may be positioned such that a portion of the containment flap material and/or the base sheet material is available for attaching to the first and/or second transition while maintaining the integrity of the fluid-impervious pouch.

In some embodiments, the sling is minimally attached to the chassis to maximize the fit and natural movement of the chassis. In some embodiments, the sling is attached to the chassis via the first transition and/or the second transition. In various embodiments, the first transition may be joined with front waist region at the front sling seam and the second transition may be joined with the back waist region at the back sling seam. In other embodiments, the first transition may be joined with the back waist region at the back sling seam and the second transition may be joined with the front waist region at the front sling seam. The first transition and/or the second transition may be joined to any suitable portion of the front waist region and/or the back waist region. For example, the first transition and/or the second transition may be joined at the waist elastic seam in the front waist region and/or the back waist region. Additionally or alternatively, the first transition and/or the second transition may be joined to the outer shell in the front waist region and/or the second waist region. In some embodiments, the first transition and/or the second transition may be integral with the chassis. In these embodiments, the integral transition is joined with the pouch using any suitable method, including those described herein. In some embodiments, the first transition and/or the second transition may be integral with the shell of the chassis. For example, FIGS. **8** and **10** representatively illustrate a transition that is integral with the shell of the chassis. In these embodiments, the integral transition is part of the shell material and is a distinct projection of the shell material.

In some of the embodiments, the sling may be attached to the chassis in the front waist region, the back waist region, and the crotch region. The sling may be attached to the chassis in the crotch region by any suitable means. For example, the sling may be sewed, ultrasonic bonded, thermal bonded, adhesive bonded, pressure bonded, and the like, and combinations thereof. In some embodiments, the sling may be attached to the chassis in the crotch region via one or more tabs. The tabs may be discrete pieces of material that are joined with both the pouch of the sling and with the chassis using any suitable means. For example, in some embodiments, the tabs may be discrete pieces of material that are ultrasonically bonded to the pouch of the sling and sewn with thread to the chassis. In various embodiments, the tabs may be attached to the chassis using any suitable sewing stitch or combinations thereof. For example, in some embodiments, the tabs may be attached to the chassis using a zig zag stitch. In some embodiments, the tabs may be positioned to at least partially overlay the crotch seam.

Referring now to FIGS. **26** and **27**, the sling **152** is joined with the crotch region **28** of the chassis **151** via discrete tabs **100** (only one visible). Specifically, the tabs **100** are joined with the sling **152** via a first tab seam **149**. Likewise, the tabs **100** are joined with the chassis **151** via a second tab seam **199**. The first tab seam **149** is an ultrasonic bond to preserve the fluid-impervious pouch **206**. The second tab seam **199** is a thread sewn bond.

In some embodiments, the tabs may be an integral part of the sling. For example, the tabs may be an integral part of one or more of the containment flaps. In these embodiments, the sling may be joined to the chassis by joining the tabs with the chassis using any suitable means. For example, in FIGS. **11-16**, the containment flap **54** includes attachment tabs **67** extending from the proximal portion **62** of the containment flap **54**. As illustrated in FIGS. **15** and **16**, the sling **52** is joined with the crotch region **28** of the chassis **51** by the attachment tabs **67** (only one visible) and tab seams **199** (only one visible).

In another example, the tab may be an integral part of the base material. In these embodiments, the sling may be joined to the chassis by joining the tabs with the chassis using any suitable means. In other embodiments, the tabs may be an integral part of both the base material and the containment flaps. For example, in FIGS. **17-22**, the side containment flaps **104** and **105** both include an integral attachment tab **94**. Likewise, the base sheet **106** includes a pair of integral attachment tabs **96**. The sling **102** may be joined with a chassis using, in part, the attachment tabs **94** and/or **96**. For example, FIGS. **21** and **22** representatively illustrate the sling **102** joined with the chassis **101** at the crotch region **28** utilizing the attachment tabs **94** and **96**.

In some embodiments, the slings of the present invention define a perimeter and are joined to the chassis about the perimeter. For example, referring again to FIG. **19**, the sling **102** defines a perimeter **115** that includes portions of the first transition **108**, the second transition **110**, and the pouch **118**. In various embodiments, the slings of the present invention may be joined to the chassis about any suitable percentage of the perimeter. For example, in some embodiments, the sling may be joined to the chassis at less than 30%, less than 25%, less than 20%, and less than 15% of the perimeter. In some embodiments, the sling may be attached to the chassis at about 22% of the perimeter. In some embodiments, the attachment tabs have a length in the longitudinal direction that is less than 75 mm, less than 50 mm, or less than 25 mm. In some embodiments, the slings of the present invention may be joined to the chassis around at least 50, 60, 70, 80, or 90% of the perimeter. In some embodiments, the slings may be joined to the chassis around about 100% of the perimeter.

The outer shell may be made of any suitable material or combination of materials. In various embodiments, the outer shells of the present invention may be made of cotton, cotton blends, nylon, nylon blends, polyester, polyester blends, rayon, rayon blends, spandex, and the like and combinations thereof. In some embodiments, the outer shells may be a blend of nylon and spandex. For example, the outer shells may be 80% nylon and 20% spandex material. In some embodiments, the outer shell may be a cotton fabric blended with spandex. For example, the outer shell may be cotton fabric having 12% to 25%, 15% to 22%, or about 20% spandex. Thus, in some embodiments, the shell may be 80% cotton and 20% spandex. In other embodiments, the outer shell may be a polyester fabric blended with spandex. In these embodiments, the polyester fabric may have 8% to 16%, 10% to 15%, or about 14% spandex. Thus, in some embodiments, the shell may be 86% polyester and 14% spandex.

In some embodiments, the shell is able to extend in the transverse direction to at least 250% (i.e., a 4-inch piece of relaxed material that is stretched to 8 inches is stretched 100% and if stretched to 14 inches is 250%). Additionally, in some embodiments, the shell is adapted to have sufficient retractive force in the transverse direction to hold the pant securely against the body both at initial donning and after insult. In some embodiments, the shell is adapted to have sufficient retractive force in the transverse direction over the extension range of about 100% to about 250%.

The retractive force of various materials can be determined by using the Strip Tensile Test described below. This test measures the load in grams and elongation in percent. In this test, two clamps, each having two jaws with each jaw having a facing in contact with the sample, hold the material in the same plane, usually vertically, separated by 3 inches and move apart at a specified rate of extension. Values for this test are obtained using a suitable sample width, a 7-inch sample length, a jaw facing size of 1 inch high by 3 inches wide, and a constant rate of extension of 300 mm/minute. The Sintech 2 tester, available from the Sintech Corporation, 1001 Sheldon Dr., Cary, N.C. 27513, is suitable for use with this test. The Instron Model™, available from the Instron Corporation, 2500 Washington St., Canton, Mass. 02021, or a Thwing-Albert Model INTELLECT II, available from the Thwing-Albert Instrument Co., 10960 Dutton Rd., Philadelphia, Pa. 19154, may also be used for this test.

Exemplary shell materials were tested using this test method. To measure the transverse direction profile, the samples were cut to 3 inches in the longitudinal direction and 7 inches in the transverse direction. To measure the longitudinal direction profile, the samples were cut to 3 inches in the transverse direction and 7 inches in the longitudinal direction.

In some embodiments, the shell material has a retractive force (per 3 inch width) in the transverse direction from about 750 grams force at 100% elongation to about 27,000 grams force at 250% elongation. In various embodiments, the shell material has a retractive force (per 3 inch width) less than about 1,500 grams at 80% elongation in the transverse direction. In some embodiments, the shell material has a load (per 3 inch width) at 150% elongation in the transverse direction of about 1,100 to about 7,000 grams force. In some embodiments, the shell material has a load (per 3 inch width) at 250% elongation in the transverse direction of about 2,000 to about 27,500 grams force. In some embodiments, the shell material has a load to elongation profile in the transverse direction within the range between Profile 1 and Profile 2, within the range between Profile 1 and Profile 3, and within the range between Profile 2 and Profile 3 as summarized in Table 1. In some embodiments, the shell material has a load to elongation profile in the transverse direction at the values of Profile 2 as summarized in Table 1.

TABLE 1

Shell Load (gram force per 3 inch width) and Elongation - Transverse Direction								
	20%	40%	60%	80%	100%	150%	200%	250%
Profile 1	174.2	311.0	446.3	591.3	747.9	1108.5	1480.2	2074.7
Profile 2	356.1	770.9	1118.2	1479.8	1895.8	3132.9	5293.3	10733.1
Profile 3	142.1	365.1	636.6	1035.1	1656.7	6867.6	21506.6	27508.9

In some embodiments, the shell material is able to extend in the longitudinal direction to at least 150%. In some embodiments, the shell is adapted to have sufficient retractive force in the longitudinal direction to hold the pant securely against the body both at initial donning and after insult. In some embodiments, the shell is adapted to have sufficient retractive force in the longitudinal direction over the extension range of about 80% to about 150%. Thus, in some embodiments, the shell has a retractive force (per 3 inch width) in the longitudinal direction from about 850 grams force at 80% elongation to about 21,250 grams force at 150% elongation. In various embodiments, the shell material has a load (per 3 inch width) at 80% elongation in the longitudinal direction of less than about 2,100 grams force. In some embodiments, the shell material has a load (per 3 inch width) at 150% elongation in the longitudinal direction of about 2,000 to about 21,250 grams force. In some embodiments, the shell material has a load to elongation profile in the longitudinal direction within the range between Profile 1 and Profile 2, within the range between Profile 1 and Profile 3, and within the range between Profile 2 and Profile 3 as summarized in Table 2. In some embodiments, the shell material has a load to elongation profile in the longitudinal direction at the values of Profile 2 as summarized in Table 2.

TABLE 2

Shell Load (gram force per 3 inch width) and Elongation - Longitudinal Direction								
	20%	40%	60%	80%	100%	150%	200%	250%
Profile 1	232.5	435.6	628.6	849.5	1103.7	2083.7	4888.1	12795.3
Profile 2	109.4	292.2	542.9	918.4	1507.1	4117.7	9950.9	18660.1
Profile 3	163.0	472.5	993.7	2067.6	4941.2	21249.1	37634.7	34704.3

The waist elastic and/or leg elastic may be made of any suitable material or combination of materials. In some embodiments, the waist elastic and/or leg elastic may be made of nylon, spandex, polyester, cotton, rayon, and the like, and combinations thereof. In some embodiments, the waist elastic and/or leg elastic may be a blend of nylon, spandex, and polyester. For example, in some embodiments, the waist elastic and/or the leg elastic may be 46% nylon, 28% spandex, and 26% polyester. In various embodiments, any suitable thread may be used to secure the waist elastic to the shell material. For example, in some embodiments, the thread used to secure the waist elastic and/or leg elastic to the shell may be polyester thread.

In some embodiments, the waist elastic is able to extend in the transverse direction to at least 200%. In some embodiments, the waist elastic is adapted to have sufficient retractive force in the transverse direction to hold the pant securely against the body both at initial donning and after insult. In some embodiments, the waist elastic is adapted to have sufficient retractive force in the transverse direction over the extension range of about 100% to about 200%. The load to elongation profile of the waist elastic can be determined by using the Strip Tensile Test described herein using a 1" by 7" sample. In various embodiments, the waist elastic has a load at 100% elongation of about 500 to about 1100 grams force. In some embodiments, the waist elastic has a load at 150% elongation of about 780 to about 2230 grams force. In some embodiments, the waist elastic has a load at 200% elongation of about 1100 to about 9500 grams force. In some embodiments, the waist elastic has a load to elongation profile in the range between Profile 1 and Profile 2, in the range between

Profile 1 and Profile 3, and in the range between Profile 2 and Profile 3 as summarized in Table 3. In some embodiments, the waist elastic has a load to elongation profile at the values of Profile 2 as summarized in Table 3.

TABLE 3

Waist Elastic Load (gram force per 1 inch width) and Elongation								
	20%	40%	60%	80%	100%	150%	200%	250%
Profile 1	139.7	234.9	326.9	415.5	513.3	779.4	1108.0	1941.5
Profile 2	357.4	506.3	634.2	779.4	951.1	1541.9	2891.9	9249.5
Profile 3	282.4	456.0	641.9	860.9	1128.5	2229.9	9585.7	25883.1

In some embodiments, the leg elastic is able to extend in the transverse direction to at least 200%. In some embodiments, the leg elastic is adapted to have sufficient retractive force in the transverse direction to hold the pant securely against the body both at initial donning and after insult. In some embodiments, the leg elastic is adapted to have sufficient retractive force over the extension range of about 100% to about 200%. The load to elongation profile of the leg elastic can be determined by using the Strip Tensile Test described herein using a ½" by 7" sample. In various embodiments, the leg elastic has a load at 100% elongation of about 230 to about 500 grams force per ½" width. In some embodiments, the leg elastic has a load at 150% elongation of about 380 to about 1800 grams force per ½" width. In some embodiments, the leg elastic has a load at 200% elongation of about 560 to about 14,250 grams force per ½" width. In some embodiments, the leg elastic has a load to elongation profile between Profile 1 and Profile 2, between Profile 1 and Profile 3, and between Profile 2 and Profile 3 as summarized in Table 4. In some embodiments, the leg elastic has a load to elongation profile at the values of Profile 2 as summarized in Table 4.

TABLE 4

Leg Elastic Load (gram force per ½ inch width) and Elongation								
	20%	40%	60%	80%	100%	150%	200%	250%
Profile 1	51.9	97.2	145.0	188.2	239.0	380.0	568.1	1078.3
Profile 2	113.9	209.1	295.8	382.4	486.2	950.8	2754.0	7436.8
Profile 3	109.1	187.7	272.2	373.1	503.4	1828.9	14240.7	20674.0

The transition materials may be made of any suitable material or combination of materials. In various embodiments, the transition materials of the present invention may be made of cotton, cotton blends, nylon, nylon blends, polyester, polyester blends, rayon, rayon blends, spandex, and the like and combinations thereof. In some embodiments, the transition materials may be a blend of nylon and spandex. For example, the transition materials may be 80% nylon and 20% spandex material. In some embodiments, the transition materials may be a cotton fabric blended with spandex. For example, the transition materials may be cotton fabric having 12% to 25%, 15% to 22%, or about 20% spandex. Thus, in some embodiments, the transition materials may be 80% cotton and 20% spandex. In other embodiments, the transition materials may be a polyester fabric blended with spandex. In these embodiments, the polyester fabric may have 8% to 16%, 10% to 15%, or about 14% spandex. Thus, in some embodiments, the transition materials may be 86% polyester and 14% spandex.

In some embodiments, the first transition is made of a first material and the second transition is made of the same first material. In other embodiments, the first transition is made of a first material and the second transition is made of a second material that is different than the first material. In various embodiments, the first transition and/or the second transition may be elastically extensible in one or more directions. For example, in some embodiments, both the first transition and the second transition are elastically extensible in the longitudinal direction and the transverse direction.

In some embodiments, the transition materials are able to extend in the transverse direction to at least 250%. Additionally, in some embodiments, the transition materials are adapted to have sufficient retractive force in the transverse direction to hold the sling securely against the body both at initial donning and after insult. In some embodiments, the transition materials are adapted to have sufficient retractive force in the transverse direction over the extension range of about 100% to about 250%. The load to elongation profile of the transition materials can be determined by using the Strip Tensile Test described herein using a 3" by 7" sample.

In some embodiments, the transition materials have a retractive force in the transverse direction from about 750 grams force per 3 inch width at 100% elongation to about 27,500 grams force per 3 inch width at 250% elongation. In various embodiments, the transition materials have a retractive force less than about 1,500 grams per 3 inch width at 80% elongation in the transverse direction. In some embodiments, the transition materials have a load at 150% elongation in the transverse direction of about 1,100 to about 7,000 grams force per 3 inch width. In some embodiments, the transition materials have a load at 250% elongation in the transverse direction of about 2,000 to about 27,500 grams force per 3 inch width. In some embodiments, the transition materials have a load to elongation profile in the transverse direction between Profile **1** and Profile **2**, between Profile **1** and Profile **3**, and between Profile **2** and Profile **3** as summarized in Table 5. In some embodiments, the transition materials have a load to elongation profile in the transverse direction at the values summarized for Profile **2** in Table 5.

TABLE 5

Transition Material Load (gram force per 3 inch width) and Elongation - Transverse Direction								
	20%	40%	60%	80%	100%	150%	200%	250%
Profile 1	174.2	311.0	446.3	591.3	747.9	1108.5	1480.2	2074.7
Profile 2	356.1	770.9	1118.2	1479.8	1895.8	3132.9	5293.3	10733.1
Profile 3	142.1	365.1	636.6	1035.1	1656.7	6867.6	21506.6	27508.9

In some embodiments, the transition materials are able to extend in the longitudinal direction to at least 150%. In some embodiments, the transition materials are adapted to have sufficient retractive force in the longitudinal direction to hold the sling securely against the body both at initial donning and after insult. In some embodiments, the transition materials are adapted to have sufficient retractive force in the longitudinal direction over the extension range of about 80% to about 150%. Thus, in some embodiments, the transition materials have a retractive force in the longitudinal direction from about 850 grams force per 3 inch width at 80% elongation to about 21,250 grams force per 3 inch width at 150% elongation. In various embodiments, the transition materials have a load at 80% elongation in the longitudinal direction of less than about 2,100 grams force per 3 inch width. In some embodiments, the transition materials have a load at 150% elongation in the longitudinal direction of about 2,000 to about 21,250 grams force per 3 inch width. In some embodiments, the transition materials have a load to elongation profile in the longitudinal direction between Profile **1** and Profile **2**, between Profile **1** and Profile **3**, and between Profile **2** and Profile **3** as summarized in Table 6. In some embodiments, the transition materials have a load to elongation profile in the longitudinal direction at the values of Profile **2**, summarized in Table 6.

TABLE 6

Transition Material Load (gram force per 3 inch width) and Elongation - Longitudinal Direction								
	20%	40%	60%	80%	100%	150%	200%	250%
Profile 1	232.5	435.6	628.6	849.5	1103.7	2083.7	4888.1	12795.3
Profile 2	109.4	292.2	542.9	918.4	1507.1	4117.7	9950.9	18660.1
Profile 3	163.0	472.5	993.7	2067.6	4941.2	21249.1	37634.7	34704.3

In some embodiments, the first transition defines a first transition width as measured in the transverse direction and a first transition length as measured in the longitudinal direction. Likewise, the second transition defines a second transition width as measured in the transverse direction and a second transition length as measured in the longitudinal direction. For example, referring again to FIG. **17**, the first transition **108** defines a first transition width **109** and a first transition length **107**. Likewise, the second transition **110** defines a second transition width **111** and a second transition length **113**. In various embodiments, the first transition width may be the same as the second transition width. In other embodiments, the first transition width may be less than the second transition width. In other embodiments, the first transition width may be greater than the second transition width. In some embodiments, the first transition width may be 100 to 125 mm and the second transition width may be 170 to 200 mm. In some embodiments, the first transition width may be about 114 mm and the second transition width may be about 185 mm.

In various embodiments, the slings of the present invention may include only a first transition or only a second transition. In various embodiments, the slings of the present invention may include both a first transition and a second transition. The first transition or second transition may be positioned in the front waist region or the back waist region in any of the embodiments described herein.

In some embodiments, the base sheet may be made of any suitable material or combination of materials. In some embodiments, the base sheet may be made of polyester, polyurethane, polypropylene, polyethylene, or the like, or combinations thereof. In some embodiments, the base sheet may be a woven polyester fabric laminated with polyurethane. In some embodiments, the base sheet may be 55% polyester and 45% polyurethane by weight. In some embodiments, the base sheet may be a woven polyester fabric laminated with a polyurethane layer. In various embodiments, the polyurethane layer may have any suitable thickness. For example, the polyurethane layer may have a 1 mm thickness. In various embodiments, the woven polyester fabric may be laminated with a polyurethane layer using any suitable joining means. For example, the polyurethane layer and the polyester fabric may be laminated together using adhesive, thermal bonding, mechanical bonding, and the like, and combinations thereof. In some embodiments, the base sheet may be a woven polyester fabric adhesively laminated to a polyurethane layer having a thickness of 1 mm.

In various embodiments, the base sheet may be elastically extensible in one or more directions. For example, in some embodiments, the base sheet may be elastically extensible in the longitudinal direction and/or the transverse direction. In other embodiments, the base sheet may be non-extensible in one or more directions.

In various embodiments, the base sheet may have any suitable shape. In some embodiments the base sheet may be rectangular or non-rectangular. For example, as illustrated in FIG. **11**, the base sheet **56** may have a curvilinear shape wherein the base sheet defines a first portion **76**, a second portion **78**, and a third portion **80**. In the illustrated embodiment, the first portion **76** has curvilinear side edges and a maximum width that is greater than the maximum width of the second portion **78**. Additionally, the third portion **80** has curvilinear side edges and a maximum width that is greater than the maximum width of the second portion **78**. The second portion **78** has relatively straight and parallel side edges.

In another example, illustrated in FIG. **17**, the base sheet **106** may have a curvilinear shape wherein the base sheet defines a first portion **126**, a second portion **128**, and a third portion **130**. In the illustrated embodiment, the first portion **126** has curvilinear side edges and a maximum width that is greater than the maximum width of the second portion **128**. Additionally, the third portion **130** has curvilinear side edges and a maximum width that is greater than the maximum width of the second portion **128**. The second portion **128** has relatively straight and parallel side edges except for the tab **96** which is a distinct projection of the base sheet **106**.

In another example, illustrated in FIG. **23**, the base sheet **154** may have a curvilinear shape wherein the base sheet defines a first portion **190**, a second portion **191**, and a third portion **198**. In the illustrated embodiment, the first portion **190** has curvilinear side edges and a maximum width that is greater than the maximum width of the second portion **191**. Additionally, the third portion **198** has curvilinear side edges and a maximum width that is greater than the maximum width of the second portion **191**. The second portion **191** has relatively straight and parallel side edges.

In another example, illustrated in FIG. **28**, the base sheet **338** may have a curvilinear shape wherein the base sheet defines a first portion **366**, a second portion **367**, and a third portion **368**. In the illustrated embodiment, the first portion **366** has curvilinear side edges and a maximum width that is greater than the maximum width of the second portion **367**. Additionally, the third portion **368** has curvilinear side edges and a maximum width that is greater than the maximum width of the second portion **367**. The second portion **367** has relatively straight and parallel side edges.

In some embodiments, the containment flap material may be made of any suitable material or combination of materials. In some embodiments, the containment flap material may be made of polyester, polyurethane, polypropylene, polyethylene, or the like, or combinations thereof. In some embodiments, the containment flap material may be a woven polyester fabric laminated with polyurethane. In some embodiments, the containment flap material may be 55% polyester and 45% polyurethane by weight. In some embodiments, the containment flap material may be a woven polyester fabric laminated with a polyurethane layer. In various embodiments, the polyurethane layer may have any suitable thickness. For example, the polyurethane layer may have a 1 mm thickness. In various embodiments, the woven polyester fabric may be laminated with a polyurethane layer using any suitable joining means. For example, the polyurethane layer and the polyester fabric may be laminated together using adhesive, thermal bonding, mechanical bonding, and the like, and combinations thereof. In some embodiments, the containment flap material may be a woven polyester fabric adhesively laminated to a polyurethane layer having a thickness of 1 mm.

In various embodiments, the containment flap material may be elastically extensible in one or more directions. For example, in some embodiments, the containment flap material may be elastically extensible in the longitudinal direction and/or the transverse direction. In other embodiments, the containment flap material may be non-extensible in one or more directions.

The flap elastic can be formed of any suitable elastic material. As is well known to those skilled in the art, suitable elastic materials include sheets, strands or ribbons of natural rubber, synthetic rubber, or thermoplastic elastomeric polymers. The flap elastic can be stretched and adhered to the containment flap, adhered to a gathered containment flap, or adhered to a containment flap and then elasticized or shrunk such that elastic retractive forces are imparted to the containment flap. In some embodiments, the flap elastic may be made of nylon, spandex, polyester, cotton, rayon, and the like, and combinations thereof. In some embodiments, the flap elastic may be a blend of nylon and spandex. For example, in some embodiments, the flap elastic may be 91% nylon and 9% spandex.

In some embodiments, the flap elastic may be a low tension fold-over-elastic. This type of flap elastic is believed to reduce the amount of gathers and potential irritation points in the containment flaps. Additionally, this type of flap elastic has a flatter profile and is believed to be more comfortable and provide more surface contact with the wearer's skin for a better gasket against the body.

In some embodiments, the flap elastic may be joined with the containment flap to define a finished flap tension. In various embodiments, the finished flap tension may be generally uniform along the entire length of the containment flap. In other embodiments, the finished flap tension may be variable along the length of the containment flap. For example, in some embodiments, the finished flap tension may be higher near the crotch region of the containment pant and may be lower near the front waist region and/or the back waist region.

Referring again to FIG. **28**, the first side containment flap **330** and the second side containment flap **332** define a distal edge **343** and a distal edge length **347**. In various embodiments, the containment flap elastic **345** (not illustrated in FIG. **28**) may be applied at variable tension along the length **347** of the flaps **330** and **332**. In some embodiments, the containment flap elastic **345** may be applied to define a first tension zone **380**, a second tension zone **381**, and a third tension zone **382**. In various embodiments, the elastic tension in the second tension zone **381** may be greater than the elastic tension in the first tension zone **380** and may be greater than the elastic tension in the third tension zone **382**. In some embodiments, the elastic tension in the first tension zone **380** may be the same as the elastic tension in the third tension zone **382**.

For example, in one embodiment, the containment flap relaxed length **347** may be 390 mm and the containment flap elastic **345** may have a relaxed length of 260 mm. The flap elastic **345** may be applied relaxed (i.e., no elongation) along the first 38 mm of the distal edge **343** to define the first tension zone **380**. The elastic **345** may be applied at an elongation of 89% along the next 276 mm of the distal edge **343** to define the second tension zone **381**. In other words, 146 mm of relaxed elastic **345** is stretched to 276 mm and then applied to the distal edge **343** in the second tension zone **381**. Finally, the elastic **345** may be applied relaxed along the final 76 mm of the distal edge **343** to define the third tension zone **382**.

In another embodiment, the containment flap relaxed length **347** may be 414 mm and the containment flap elastic **345** may have a relaxed length of 273 mm. The flap elastic **345** may be applied relaxed (i.e., no elongation) along the first 38 mm of the distal edge **343** to define the first tension zone **380**. The elastic **345** may be applied at an elongation of 85% along the next 300 mm of the distal edge **343** to define the second tension zone **381**. In other words, 162 mm of relaxed elastic **345** is stretched to 300 mm and then applied to the distal edge **343** in the second tension zone **381**. Finally, the elastic **345** may be applied relaxed along the final 76 mm of the distal edge **343** to define the third tension zone **382**.

In various embodiments, the containment flap elastic **345** may be applied in the second tension zone **381** at 0 to 200% elongation, 50 to 150% elongation, or about 70 to 90% elongation. In various embodiments, the containment flap elastic **345** may be applied in the first tension zone **380** and/or the third tension zone **382** at 0 to 150% elongation.

In various embodiments, at least one of the materials of the containment pant is treated to be more fluid impervious. For example, in any of the embodiments described herein, at least one of the shell, waist elastic, leg elastic, transitions, base sheet, containment flaps, containment flap elastic, and thread are treated to be more fluid impervious. In various embodiments, the treatment may include coating the materials in any suitable manner using a durable water resistant treatment. In some embodiments, the durable water resistant treatment may include a polymer coating. In some embodiments, the base sheet and/or the containment flaps may include a fabric laminated with polyurethane wherein the fabric side of the base sheet is treated with a durable water resistant treatment. In some embodiments, the base sheet and the containment flaps may be made from a woven polyester fabric treated with a durable water resistant treatment and laminated with a polyurethane sheet. In some embodiments, the thread used to join the containment flap elastic to the containment flaps may be treated with a durable water resistant treatment.

In some embodiments, the containment pants of the present invention may be adapted to fit a wide range of sizes. In some embodiments, an exemplary containment pant may be adapted to fit children weighing between 38 and 65 pounds. In some embodiments, an exemplary containment pant may be adapted to fit children weighing between 60 and 120 pounds. To facilitate such a wide range of weight and maintain proper fit, the containment pants of the present invention may be adapted in the waist, hip, and/or legs to extend up to about 100% while still providing sufficient retractive force to hold the pants securely against the body at donning, during use, and after insult.

To measure the force-elongation profile of the containment pants, the following apparatus and procedures are used. The apparatus **388** is illustrated in FIGS. **32-34** and includes a constant rate of extension tensile tester **390**. The tensile tester **390** includes a load cell **391**, an upper peg **394**, a lower peg **396**, an upper fixture **398**, and a lower fixture **400**. A test pant **392** is placed on the upper peg **394** and the lower peg **396** in various configurations. The test pant **392** is extended in the direction **399** and the load is measured at various extensions and/or circumferences.

In a first configuration, the test pant **392** is positioned on the upper peg **394** and the lower peg **396** as generally illustrated in FIG. **32**. In this configuration, the test pant **392** is positioned to measure the "whole pant waist tension". For this test, the upper peg **394** and the lower peg **396** have a circumference of 62 mm, a length of 70 mm, and are made from a rigid polymeric material having a smooth surface. In this configuration, the upper peg **394** and the lower peg **396** are inserted through the waist opening **393** of the test pant **392** only to the extent necessary to span the waist elastic **386**.

In a second configuration, the test pant **392** is positioned on the upper peg **394** and the lower peg **396** as illustrated in FIG. **33**. In this configuration, the test pant **392** is positioned to measure the "whole pant hip tension". For this test, the upper peg **394** and the lower peg **396** have a circumference of 78.5 mm, a length of 130 mm, and are made from a rigid polymeric material having a smooth surface. In this configuration, the upper peg **394** and the lower peg **396** are inserted through the waist opening **393** of the test pant **392** and extend from the leg openings **395**. The portions of the test pant **392** in contact with the upper and lower pegs **394** and **396** are centered on the respective peg.

In a third configuration, the test pant **392** is positioned on the upper peg **394** and the lower peg **396** as illustrated in FIG. **34**. In this configuration, the test pant **392** is positioned to measure the "whole pant leg tension". For this test, the upper peg **394** and the lower peg **396** have a circumference of 62 mm, a length of 70 mm, and are made from a rigid polymeric material having a smooth surface. In this configuration, the upper peg **394** and the lower peg **396** are inserted through the leg opening **395** of the test pant **392** to a depth of 1 inch.

In each of these configurations, the upper peg **394** and the lower peg **396** are free to rotate about the axis **397**. Before testing, the test pant **392** is hung from the upper peg **394** to account for the force of the test pant and thus "zero" the load cell. The gauge length is selected for the waist opening or leg opening being tested so as to provide a tension of less than 50 grams prior to the start of the test. The upper peg **394** and the lower peg **396** are separated until a load of 50 grams tension is attained and the gauge length is recorded and the percent elongation is defined as zero. The upper peg **394** and the lower peg **396** are moved apart at a crosshead speed of 508 mm/min and tensions at various gauge lengths are recorded and percent elongation is calculated. The circumference of the test pant **392** is calculated as two times the gauge length plus ½ the circumference of the upper peg **394** plus ½ the circumference of the lower peg **396**.

The tensile tester **390** may be any suitable constant rate of extension tensile tester such as the MTS tensile tester model Synergie 200 Test Bed which is available from MTS(R) Systems Corporation, Research Triangle Park, N.C. USA. The tensile tester includes suitable load cells selected so the majority of the peak load values fall between the manufacturer's recommended ranges of the load cell's full scale value.

The test procedure is conducted in standard ASTM laboratory conditions: atmosphere of 23+−2[deg.] C. (73.4+−3.6 [deg.] F.) and 50+−5% relative humidity. The test pants are measured after equilibration to laboratory conditions.

The whole pant waist tension, whole pant hip tension, and whole pant leg tension were measured for several different test pants using the test method described above. The results of these tests are summarized below in Tables 7, 8, and 9. The pants included Code A, which is an exemplary pant of the present invention adapted for females in the weight range of 38 to 65 pounds. Code B is an exemplary pant of the present invention adapted for males in the weight range of 38 to 65 pounds. Code C is an exemplary pant of the present invention adapted for females in the weight range of 60 to 120 pounds. Code D is an exemplary pant of the present invention adapted for males in the weight range of 60 to 120 pounds.

Tables 7, 8, and 9 summarize the force in grams (rounded to the nearest gram) at various circumferences as measured in mm. The percent elongation is calculated as the difference between the circumference at a given tension and the circumference at 50 grams force divided by the circumference at 50 gram force. Each value represents the average measurements of 3 pants. This data is graphically represented in FIGS. **40-45**.

TABLE 7

Whole Pant - Waist Tension											
A	Force (g)	50	107	618	746	837	908	1004	1079	1187	1330
	Circ. (mm)	425	451	501	531	551	565	585	601	621	645
	Elongation	0%	6%	18%	25%	30%	33%	38%	41%	46%	52%

TABLE 7-continued

Whole Pant - Waist Tension												
B	Force (g)	50	437	712	836	925	1044	1131	1261	1433		
	Circ. (mm)	457	501	531	551	565	585	601	621	645		
	Elongation	0%	10%	16%	21%	24%	28%	32%	36%	41%		
C	Force (g)	50	397	533	649	723	828	970	1263	1336	1581	
	Circ. (mm)	533	551	565	585	601	621	645	691	701	731	
	Elongation	0%	3%	6%	10%	13%	17%	21%	30%	32%	37%	
D	Force (g)	50	208	423	580	716	807	927	1084	1407	1492	1772
	Circ. (mm)	511	531	551	565	585	601	621	645	691	701	731
	Elongation	0%	4%	8%	11%	14%	18%	22%	26%	35%	37%	43%

TABLE 8

Whole Pant - Hip Tension															
A	Force (g)	50	264	669	912	1233	1329	1475	1830	2325	2563				
	Circ. (mm)	427	451	495	531	565	575	591	625	671	691				
	Elongation	0%	6%	16%	24%	32%	35%	38%	46%	57%	62%				
B	Force (g)	50	591	1084	1509	1634	1828	2307	2997	3335					
	Circ. (mm)	451	495	531	565	575	591	625	671	691					
	Elongation	0%	10%	18%	25%	27%	31%	39%	49%	53%					
C	Force (g)	50	392	724	816	965	1339	1883	2155	2762	3013	3741	4338	4655	5567
	Circ. (mm)	499	531	565	575	591	625	671	691	731	745	785	815	831	871
	Elongation	0%	6%	13%	15%	18%	25%	34%	38%	46%	49%	57%	63%	67%	75%
D	Force (g)	50	244	806	934	1122	1576	2234	2560	3283	3578	4435	5138	5522	6682
	Circ. (mm)	503	531	565	575	591	625	671	691	731	745	785	815	831	871
	Elongation	0%	6%	12%	14%	17%	24%	33%	37%	45%	48%	56%	62%	65%	73%

TABLE 9

Whole Pant - Leg Tension												
A	Force (g/in)	50	137	207	299	408	539	651				
	Circ. (mm)	339	355	380	400	425	455	480				
	Elongation	0%	5%	12%	18%	25%	34%	42%				
B	Force (g/in)	50	158	288	393	521	681	826				
	Circ. (mm)	333	355	380	400	425	455	480				
	Elongation	0%	7%	14%	20%	28%	37%	44%				
C	Force (g/in)	50	111	244	410	564	693	830	1032	1186	3432	4888
	Circ. (mm)	385	400	425	455	480	500	520	550	570	720	760
	Elongation	0%	4%	10%	18%	25%	30%	35%	43%	48%	87%	97%
D	Force (g/in)	50	70	225	364	491	619	827	983	2817	3828	
	Circ. (mm)	419	425	455	480	500	520	550	570	720	760	
	Elongation	0%	1%	9%	15%	19%	24%	31%	36%	72%	81%	

The various containment pants of the present invention are adapted to receive and support a discrete absorbent insert. As used herein, the term "discrete absorbent insert" refers to a self-contained absorbent structure that is adapted for insertion and removal from a pant without tearing, breaking, or otherwise damaging the self-contained absorbent structure or the pant. In some embodiments, the absorbent insert has a relatively high capacity adapted for enuretic children and/or for use overnight. In various embodiments, the pants of the present invention are devoid of an integrated absorbent core. As used herein, the term "integrated absorbent core" refers to a mass of fibers, particulate, foam, or the like, or combinations thereof having an absorbent capacity of at least 5 g/g and being contained within a pant and not being adapted for removal from the pant without tearing, breaking, or otherwise damaging the pant and/or the absorbent core. Suitable absorbent inserts are also described in patent application U.S. Ser. No. 13/548,000, entitled "Absorbent Insert", filed on Jul. 12, 2012, the entirety of which is incorporated herein by reference.

Referring now to FIGS. **35** and **36**, a first exemplary absorbent insert **230** is representatively illustrated. FIG. **35** is a top plan view of the absorbent insert **230** with portions cut away to better illustrate underlying structure. FIG. **36** is an expanded cross-sectional view of the absorbent insert of FIG. **35** taken along the line C-C. The absorbent insert **230** defines a longitudinal-direction **48**, a relatively shorter, transverse direction **50**, and a thickness direction **49**. The transverse direction extends generally perpendicular to the longitudinal direction, and the thickness or z-direction extends generally perpendicular to both the longitudinal-direction and transverse direction.

The absorbent insert **230** includes a first sheet **232** and a second sheet **234** in facing relation with the first sheet **232**. The absorbent insert **230** also includes an absorbent core **236** positioned between the first sheet **232** and the second sheet **234**. FIG. **37** is a top plan view of the absorbent core **236** removed from the absorbent insert **230** of FIG. **35** to better illustrate detail. The absorbent core **236** defines a core perimeter **238**, and the first sheet **232** and the second sheet **234** extend beyond the core perimeter **238**, and are joined together to form a perimeter seal **240**. The outer extent of the first sheet **232** and/or the second sheet **234** defines the absorbent insert perimeter **239**. The absorbent insert perimeter **239** in turn defines an absorbent insert area **269**.

The absorbent insert **230** defines an absorbent insert width **266** and an absorbent insert length **268**. The absorbent insert **230** defines a first end section **270**, a second end section **272**, and a central section **274** in the longitudinal direction **48**. The central section **274** extends between the first end section **270** and the second end section **272**. The first end section **270** defines a first end section width **276** and a first end section length **278**. The second end section **272** defines a second end section width **280** and a second end section length **282**. The central section **274** defines a central section width **284** and a central section length **286**. The first end section length **278** plus the second end section length **282** plus the central section length **286** equals the absorbent insert length **268**. The widths of the various sections are measured in the transverse direction **50** and the lengths of the various sections are measured in the longitudinal direction **48**.

Referring now to FIGS. **38** and **39**, another exemplary absorbent insert **244** is representatively illustrated. FIG. **38** is a top plan view of the absorbent insert **244** with portions cut away to better illustrate underlying structure. FIG. **39** is an expanded cross-sectional view of the absorbent insert of FIG. **38** taken along the line D-D. The absorbent insert **244** includes a first sheet **232** and a second sheet **234** in facing relation with the first sheet **232**. The absorbent insert **244** also includes an absorbent core **248** positioned between the first sheet **232** and the second sheet **234**. The absorbent core **248** defines a core perimeter **238** and the first sheet and the second sheet extend beyond the core perimeter **238** and are joined together to form a perimeter seal **240**. The outer extent of the first sheet **232** and/or the second sheet **234** defines the absorbent insert perimeter which in turn defines an absorbent insert area. The absorbent insert **244** also includes a first intake material **242** positioned between the absorbent core **248** and the first sheet **232** and a second intake material **246** positioned between the absorbent core **248** and the second sheet **234**.

In any of the embodiments disclosed herein, one or more of the absorbent inserts and/or one or more of the absorbent cores may further include one or more positioning notches. As used herein, the term "positioning notch" refers to any physical structure created within an absorbent insert and/or absorbent core that is adapted to engage and align with a positioning key and that is adapted to at least partially surround portions of the positioning key when the absorbent insert is placed within a pouch. The positioning notches are believed to aid alignment of the discrete absorbent insert with the pouch during insertion of the absorbent insert into the pouch. Additionally, the positioning notches are believed to minimize shifting of the absorbent insert relative to the fluid impervious pouch after insertion and during use.

In various embodiments the positioning notches may be open or closed. As used herein, the term "open" refers to an absorbent core positioning notch or an absorbent insert positioning notch that defines a volume that is adapted to engage a positioning key without tearing, cutting, ripping, or otherwise separating portions of the respective absorbent insert or absorbent core prior to engagement with a positioning key. In comparison, the term "closed" refers to an absorbent core positioning notch or an absorbent insert positioning notch that requires tearing, cutting, ripping, or otherwise separating portions of the respective absorbent insert or absorbent core prior to engagement with a positioning key. For example, a line of weakness may be adapted to be torn prior to engagement with a positioning key.

Referring now to FIGS. **52**, **53**, and **54**, another exemplary absorbent insert **460** is representatively illustrated. FIG. **52** is a top plan view of the absorbent insert **460** with portions cut away to better illustrate underlying structure. FIG. **53** is an expanded cross-sectional view of the absorbent insert of FIG. **52** taken along the line E-E. FIG. **54** is an expanded cross-sectional view of the absorbent insert of FIG. **52** taken along the line F-F. The absorbent insert **460** is similar in construction to the absorbent insert **230** in FIG. **35** but with the addition of a first absorbent insert positioning notch **462**, a first absorbent core positioning notch **464**, a second absorbent insert positioning notch **466**, and a second absorbent core positioning notch **468**. In various embodiments, one or more of these exemplary open positioning notches may be incorporated into any of the absorbent inserts described herein.

The absorbent insert **460** includes a first sheet **470** and a second sheet **472** in facing relation with the first sheet **470**. The absorbent insert **460** also includes an absorbent core **474** positioned between the first sheet **470** and the second sheet **472**. The absorbent core **474** defines a core perimeter **476**. The first sheet **470** and the second sheet **472** extend beyond the core perimeter **476** and are joined together to form a perimeter seal **478**. The outer extent of the first sheet **470** and/or the second sheet **472** defines an absorbent insert perimeter **480**. The absorbent insert perimeter **480** in turn defines an absorbent insert area.

The absorbent insert **460** also defines an absorbent insert width, an absorbent insert length, a first end section, a second end section, a central section, a first end section width, a first end section length, a second end section width, a second end section length, a central section width, and a central section length, all similar to the absorbent insert **230** of FIG. **35**.

Referring now to FIG. **55**, another exemplary absorbent insert **490** is representatively illustrated. The absorbent insert **490** is similar in construction to the absorbent insert **230** in FIG. **35** but with the addition of a first absorbent insert positioning notch **492**, a first absorbent core positioning notch **494**, a second absorbent insert positioning notch **496**, and a second absorbent core positioning notch **498**. In various embodiments, one or more of these exemplary open positioning notches may be incorporated into any of the absorbent inserts described herein.

The absorbent insert **490** includes a first sheet **500** and a second sheet **502** in facing relation with the first sheet **500**. The absorbent insert **490** also includes an absorbent core **504** positioned between the first sheet **500** and the second sheet **502**. The absorbent core **504** defines a core perimeter **506**. The first sheet **500** and the second sheet **502** extend beyond the core perimeter **506** and are joined together to form a perimeter seal **508**. The outer extent of the first sheet **500** and/or the second sheet **502** defines an absorbent insert perimeter **510**. The absorbent insert perimeter **510** in turn defines an absorbent insert area.

The absorbent insert **490** also defines an absorbent insert width, an absorbent insert length, a first end section, a second end section, a central section, a first end section width, a first end section length, a second end section width, a second end section length, a central section width, and a central section length, all similar to the absorbent insert **230** of FIG. **35**.

Referring now to FIG. **56**, another exemplary absorbent insert **520** is representatively illustrated with portions cut away to better illustrate underlying structure.

FIG. **57** is an expanded cross-sectional view of the absorbent insert of FIG. **56** taken along the line G-G. The absorbent insert **520** is similar in construction to the absorbent insert **230** in FIG. **35** but with the addition of a first absorbent insert positioning notch **522**, a first absorbent core positioning notch **524**, a second absorbent insert positioning notch **526**, and a second absorbent core positioning notch **528**. In this embodiment, the absorbent insert **520** includes a combination of open notches and closed notches. Specifically, the first absorbent core positioning notch **524** and the second absorbent core positioning notch **526** are illustrated as open notches and the first absorbent insert positioning notch **522** and the second absorbent insert positioning notch **526** are illustrated as closed notches having lines of weakness **542**. The lines of weakness **542** may be perforations, score lines, thermally weakened lines, or similar lines of weakness, or combinations thereof, that allow the absorbent insert **520** to be separated. In various embodiments, one or more of these exemplary positioning notches may be incorporated into any of the absorbent inserts described herein.

The absorbent insert **520** includes a first sheet **530** and a second sheet **532** in facing relation with the first sheet **530**. The absorbent insert **520** also includes an absorbent core **534** positioned between the first sheet **530** and the second sheet **532**. The absorbent core **534** defines a core perimeter **536**. The first sheet **530** and the second sheet **532** extend beyond the core perimeter **536** and are joined together to form a perimeter seal **538**. The outer extent of the first sheet **530** and/or the second sheet **532** defines an absorbent insert perimeter **540**. The absorbent insert perimeter **540** in turn defines an absorbent insert area.

The absorbent insert **520** also defines an absorbent insert width, an absorbent insert length, a first end section, a second end section, a central section, a first end section width, a first end section length, a second end section width, a second end section length, a central section width, and a central section length, all similar to the absorbent insert **230** of FIG. **35**.

In various embodiments, the positioning notches may have any suitable width and any suitable depth. In general, the width of a respective positioning notch is the maximum dimension that can be spanned in the transverse direction without deforming the positioning notch. Likewise, the depth of a respective positioning notch is the maximum dimension that can be inserted in the longitudinal direction without deforming the positioning notch.

For example, referring again to FIG. **52**, an absorbent insert positioning notch depth **548** is measured in the longitudinal direction **48** from a leading edge **552** of the absorbent insert positioning notch **466** to a trailing edge **554** of the absorbent insert positioning notch **466** as representatively illustrated. Likewise, the absorbent core positioning notch depth **550** is measured from a leading edge **556** of the absorbent core positioning notch **468** to a trailing edge **558** of the absorbent core positioning notch **468**. In various embodiments, the absorbent insert positioning notch depth may be 30 to 60 mm, 35 to 50 mm, or about 43 mm. In various embodiments, the absorbent core positioning notch depth may be 30 to 60 mm, 35 to 50 mm, or about 43 mm. In various embodiments, the absorbent core positioning notch depth may be greater than, less than, or equal to the absorbent insert positioning notch depth.

Still referring to FIG. **52**, an absorbent insert positioning notch width **544** is measured in the transverse direction **50** from one side of the absorbent insert positioning notch to the other side of the absorbent insert positioning notch as representatively illustrated. Likewise, the absorbent core positioning notch width **546** is measured from one side of the absorbent core positioning notch to the other side of the absorbent core positioning notch. In various embodiments the absorbent insert positioning notch width **544** and/or the absorbent core positioning notch width **546** may vary significantly as measured along the depth of the respective positioning notch as illustrated in FIG. **55**. In other embodiments, the absorbent insert positioning notch width **544** and/or the absorbent core positioning notch width **546** may vary gradually as measured along the depth of the respective positioning notch as illustrated in FIG. **52**. As such, in some embodiments, the width of a positioning notch may be characterized by the measurement at 50% the respective notch depth. In various embodiments, the absorbent insert positioning notch width at 50% the absorbent insert positioning notch depth may be 1 to 15 mm, 5 to 10 mm, or about 7 mm. In various embodiments, the absorbent core positioning notch width at 50% the absorbent core positioning notch depth may be 10 to 25 mm, 15 to 20 mm, or about 17 mm.

In embodiments having an absorbent core positioning notch, the absorbent core width is separated by the absorbent core positioning notch to define a first sub-width and a second sub-width. The sub-widths are measured in the transverse direction from an absorbent core perimeter to an absorbent core positioning notch perimeter. In general, the respective sub-widths are the minimum dimension that can span the respective sub-widths without deforming the absorbent core. For example, referring again to FIG. **52**, the exemplary absorbent insert **460** has an absorbent core width **288** that is separated by the absorbent core positioning notch **464** to define a first sub-width **560** and a second sub-width **562**. The first sub-width **560** is measured in the transverse direction **50** from the absorbent core perimeter **476** to the absorbent core positioning notch perimeter **564**. Likewise, the second sub-width **562** is measured in the transverse direction **50** from the absorbent core positioning notch perimeter **564** to the absorbent core perimeter **476**. In embodiments, having multiple absorbent core positioning notches, the respective absorbent core widths may be separated to define a third sub-width, a fourth sub-width, etc. In various embodiments, the sub-widths may be 60 to 90 mm, 70 to 80 mm, or about 70 mm. In some embodiments, a first sub-width may be 90 to 110% of a second sub-width. In some embodiments, the first sub-width may be about 100% the second sub-width. In these embodiments, the absorbent core positioning notch is essentially centered within the absorbent core in the transverse direction.

In an embodiment adapted for use by a child weighing 60 to 120 pounds, any of the absorbent inserts described herein may have an absorbent insert length of 425 to 475 mm, or 430 to 450 mm, or about 440 mm. In an embodiment adapted for use by a child weighing 38 to 65 pounds, any of the absorbent inserts described herein may have an absorbent insert length of 375 to 425 mm, 390 to 410 mm, or about 400 mm. In various embodiments, the first end section length may equal the central section length which may equal the second end section length. In other embodiments, the first end section length may equal the second end section length and the central section length may be different. For example, the first end section length may be about 35% the absorbent insert length, the second end section length may be about 35% the absorbent insert length, and the central section length may be about 30% the absorbent insert length. In another example, the first end section length may be about 30% the absorbent insert length, the second end section length may be about 30% the absorbent insert length, and the central section length may be about 40% the absorbent insert length.

In various embodiments, any of the absorbent inserts described herein may have a width that varies at different points along the longitudinal direction. For example, as illustrated in FIG. **35**, the absorbent insert **230** has a variable width at different points along the longitudinal direction. In this embodiment, the first end section **270** and the second end section **272** have a maximum width that is greater than the maximum width of the central section **274**. For example, in some embodiments, the first end section and the second end section may have a maximum width of about 160 to 210 mm, 170 to 200 mm, 180 to 190 mm or about 186 mm. In these embodiments, the central section may have a maximum width of about 90 to 130 mm, about 100 to 120 mm, or about 114 mm.

In various embodiments, the first end section, the second end section, and/or the central section may have a variable width at different points along the longitudinal direction or may have a consistent width at different points along the longitudinal direction. In some embodiments, the first end section and the second end section may have variable width at different points along the longitudinal direction and the central section may have a consistent width at different points along the longitudinal direction as illustrated in FIG. **35**. In some embodiments, the first end section and the second end section may have a width that varies from 186 mm at the maximum to 114 mm at the minimum. In these embodiments, the central section may have a consistent width of about 114 mm.

In some embodiments, and exemplified in FIG. **35**, the absorbent insert defines a first reference width **316** measured at ⅛ the absorbent insert length **268**, a second reference width **317** measured at ½ the absorbent insert length **268**, and a third reference width **318** measured at ⅞ the absorbent insert length **268**. In some embodiments, the first reference width **316** may be equal to the third reference width **318** and the second reference width **317** may be less than the first and third reference widths **316** and **318**. In some embodiments, the second reference width **317** may be less than 50%, 60%, 70%, or 80% the first reference width **316** and/or the third reference width **318**. In some embodiments, the second reference width **317** may be about 60% the first reference width **316** and the third reference width **318**.

In various embodiments, the absorbent insert area may be any suitable value. For example, in embodiments adapted for use by a child weighing 60 to 120 pounds, the absorbent insert area may be about 65,000 mm^2. In embodiments adapted for use by a child weighing 38 to 65 pounds, the absorbent insert area may be about 57,600 mm^2.

In various embodiments, the absorbent insert may define any suitable shape. For example, the absorbent insert may have a symmetric shape about the transverse centerline like that illustrated in FIG. **35** or may have an asymmetric shape about the transverse centerline like that illustrated in FIG. **38**. In various embodiments, the absorbent inserts may have a rectangle shape, dog-bone shape, hourglass shape, T-shape, or the like.

Referring again to FIG. **37**, the absorbent core **236** defines an absorbent core width **288** and an absorbent core length **289**. The absorbent core **236** also defines a first end section **290**, a second end section **292**, and a central section **294** in the longitudinal direction **48**. The central section **294** extends between the first end section **290** and the second end section **292**. The first end section **290** defines a first end section width **296** and a first end section length **298**. The second end section **292** defines a second end section width **300** and a second end section length **302**. The central section **294** defines a central section width **304** and a central section length **306**. The first end section length **298** plus the second end section length **302** plus the central section length **306** equals the absorbent core length **289**. The widths of the various sections are measured in the transverse direction **50** and the lengths of the various sections are measured in the longitudinal direction **48**.

In an embodiment adapted for use by a child weighing 60 to 120 pounds, any of the absorbent inserts described herein may have an absorbent core length of 350 to 450 mm, 375 to 425 mm, 390 to 410 mm, or about 400 mm. In an embodiment adapted for use by a child weighing 38 to 65 pounds, any of the absorbent inserts described herein may have an absorbent core length of 340 to 380 mm, 350 to 370 mm, or about 360 mm. In various embodiments, the first end section length may equal the central section length which may equal the second end section length. In other embodiments, the first end section length may equal the second end section length and the central section length may be different. For example, the first end section length may be about 25% the absorbent core length, the second end section length may be about 25% the absorbent core length, and the central section length may be about 50% the absorbent core length. In another example, the first end section length may be about 30% the absorbent core length, the second end section length may be about 30% the absorbent core length, and the central section length may be about 40% the absorbent core length.

In various embodiments, any of the absorbent inserts described herein may have an absorbent core having a width that varies at different points along the longitudinal direction. For example, as illustrated in FIG. **37**, the absorbent core **236** has a variable width at different points along the longitudinal direction. In this embodiment, the first end section **290** and the second end section **292** have a maximum width that is greater than the maximum width of the central section **294**. For example, in various embodiments, the first end section and the second end section may have a maximum width of about 120 to 165 mm, 135 to 150 mm, or about 145 mm. In some embodiments, the maximum width is at least 120 mm, at least 130 mm, at least 140 mm, or at least 145 mm. In these embodiments, the central section may have a maximum width of about 55 to 95 mm, 65 to 85 mm or about 75 mm. In some embodiments, the central section may have a maximum width of less than 110, less than 100, less than 95, less than 90, less than 85, less than 80, or less than 75 mm.

In various embodiments, the first end section, the second end section, and/or the central section may have a variable width at different points along the longitudinal direction or may have a consistent width at different points along the longitudinal direction. In some embodiments, the first end section and the second end section may have variable width at different points along the longitudinal direction and the central section may have a consistent width at different points along the longitudinal direction as illustrated in FIG. **37**. In some embodiments, the first end section and the second end section may have a width that varies from 145 mm at the maximum to 75 mm at the minimum. In these embodiments, the central section may have a consistent width of about 75 mm.

In some embodiments, any of the absorbent inserts described herein may include an absorbent core defining a first reference width **320** measured at ⅛ the absorbent core length **289**, a second reference width **321** measured at ½ the absorbent core length **289**, and a third reference width **322** measured at ⅞ the absorbent core length **289**. In some embodiments, the first reference width **320** may be equal to the third reference width **322** and the second reference width **321** may be less than the first and third reference widths **320** and **322**. In some embodiments, the second reference width **321** may be less than 40%, 50%, 60%, 70%, or 80% the first reference width **320** and/or the third reference width **322**. In some embodiments, the second reference width **321** may be about 50% the first reference width **320** and the third reference width **322**.

The absorbent core also defines an absorbent core area. In various embodiments, the absorbent core area may be any suitable value. For example, in an embodiment adapted for use by a child weighing 60 to 120 pounds, any of the absorbent inserts described herein may have an absorbent core area of about 42,000 mm^2. In an embodiment adapted for use by a child weighing 38 to 65 pounds, any of the absorbent inserts described herein may have an absorbent core area of about 36,300 mm^2.

In various embodiments, any of the absorbent inserts described herein may have a perimeter seal of any suitable width and may be formed by any suitable method. Referring again to FIGS. **35-36**, the perimeter seal width **241** is representatively illustrated. In some embodiments, the perimeter seal width may be at least 5, at least 10, at least 15, or at least 20 mm. The perimeter seal may include adhesive bonding, thermal bonding, ultrasonic bonding, pressure bonding, and the like, and combinations thereof. In some embodiments, the first sheet may be joined to the second sheet at the perimeter seal via adhesive bonding and the perimeter seal width may be at least 20 mm. In other embodiments, the first sheet may be joined to the second sheet at the perimeter seal via ultrasonic bonding and the perimeter seal width may be at least 10 mm.

In embodiments having an absorbent insert positioning notch and an absorbent core positioning notch, the perimeter seal continues into the absorbent core positioning notch. In some embodiments, the perimeter seal has the same width within the positioning notch as it does outside the positioning notch as illustrated in FIGS. **52** and **55**. In other embodiments, the perimeter seal has a greater width within the positioning notch as compared to the width outside the positioning notch as illustrated in FIG. **56**. In other embodiments, the perimeter seal has a lesser width within the positioning notch as compared to the width outside the positioning notch (not illustrated).

In some embodiments, any of the absorbent inserts described herein may be substantially devoid of fluid-impervious materials. In some embodiments, any of the absorbent inserts described herein may not include a fluid-impervious barrier layer. In comparison, many absorbent articles include a fluid-impervious back sheet or baffle which is provided to prevent fluid from contacting the clothes of the wearer or a delay layer which is provided to slow or divert the fluid. In the present invention, the absorbent insert is positioned within the fluid-impervious pouch and thus does not require a fluid-impervious layer as part of the absorbent insert. Additionally, this design is believed to be beneficial in some embodiments over conventional inserts because fluid can be absorbed into the absorbent insert along the entire pad, including the body-facing surface, the garment-facing surface, and the sides. Additionally, the omission of a fluid-impervious layer eliminates the risk of fluid being trapped between the fluid-impervious pouch and the absorbent insert which might cause leaking during use or leaking when removing the absorbent insert from the pouch.

In some embodiments, any of the absorbent inserts described herein may have one or more intake layers. For example, the absorbent inserts of FIGS. **35**, **52**, **55**, and **56** are illustrated with a first intake material **242** positioned between the first sheet and the absorbent core. In some embodiments, the absorbent insert may additionally or alternatively include a second intake material. For example, the absorbent insert **244** of FIGS. **38** and **39** is illustrated with a first intake material **242** and a second intake material **246**.

In various embodiments, the first intake material and/or the second intake material may have any suitable length, width, or shape. For example, referring again to FIG. **35**, the first intake material **242** defines an intake material width **324** and an intake material length **325**. In various embodiments, the intake material width may be 50 to 70 mm or about 62 mm. In these embodiments, the intake material width may be at least 70%, 80%, or 90% the second reference width **317** of the absorbent core. In some embodiments, the intake material width may be about 84% the second reference width **317** of the absorbent core.

In some embodiments, the intake material length may be about 325 to 375 mm, 340 to 360 mm, or about 355 mm. In these embodiments, the intake material length may be at least 70%, 80%, or 90% the absorbent core length. In some embodiments, the intake material length may be about 88% the absorbent core length.

In various embodiments, the intake materials may be rectangular as illustrated in FIG. **35** or may be any other suitable shape. For example, in various embodiments, the intake materials may be shaped similarly to the absorbent insert and/or the absorbent core.

In various embodiments, any of the absorbent inserts described herein may have absorbent cores having absorbent material and one or more wrap sheets. For example, in some embodiments, the absorbent cores may include a single wrap sheet folded around the longitudinal side edges of the absorbent material and overlapping upon itself to form a fully wrapped absorbent core. In other embodiments, the absorbent core may include two wrap sheets. In these embodiments, one of the wrap sheets may be primarily positioned on a first-facing surface of the absorbent material. The other wrap sheet may be primarily positioned on the second-facing surface of the absorbent material. In these embodiments, the wrap sheet on the second-facing surface may extend to the longitudinal side edges of the absorbent material, may wrap around the longitudinal side edges of the absorbent material, or may extend to the first-facing surface of the absorbent material. Likewise, the wrap sheet on the first-facing surface may extend to the longitudinal side edges of the absorbent material, may wrap around the longitudinal side edges of the absorbent material, or may extend to the second-facing surface of the absorbent material. The wrap sheets may overlap themselves or may overlap each other.

Referring again to FIGS. **36** and **52-57**, the respective absorbent cores are representatively illustrated with a first wrap sheet **252** positioned on a first-facing surface **256** of the absorbent material **253**. The first wrap sheet **252** extends between the longitudinal side edges **260** of the absorbent material **253**. The respective absorbent cores also include a second wrap sheet **254** positioned on a second-facing surface **258** of the absorbent material **253**. The second wrap sheet **254** extends between the longitudinal side edges **260** of the absorbent material **253**.

Referring again to FIG. **39**, the absorbent core **248** is representatively illustrated with a wrap sheet **262** positioned on a first-facing surface **256** of the absorbent material **253**. The wrap sheet **262** extends around the longitudinal side edges **260** of the absorbent material **253** and is also positioned on a second-facing surface **258** of the absorbent material **253**. The wrap sheet **262** may at least partially overlay itself at overlap **264**.

In various embodiments, the first sheet and the second sheet may be made of the same material or may be different. In some embodiments, the first sheet and the second sheet may have the same basis weight or may be different. The first sheet and/or the second sheet may be fluid permeable and may be made of substantially hydrophobic fibrous material. For example, the first sheet and/or the second sheet may be a spunbond web composed of synthetic polymer filaments. In some embodiments, the first sheet and/or the second sheet may be a meltblown web or a bonded-carded-web composed of synthetic polymer filaments. Suitable synthetic polymers include, for example, polyethylene, polypropylene, polyester, and the like, and combinations thereof. In some embodiments, both the first sheet and the second sheet are spunbond polypropylene nonwoven webs having an individual basis weight of about 15 gsm. In some embodiments, the first sheet and/or the second sheet may be treated with surfactants to adjust the degree of hydrophobicity and wettability. In some embodiments, the first sheet and/or the second sheet may be embossed, apertured, slit, or otherwise mechanically worked.

The absorbent core typically includes absorbent material composed of airlaid, cellulosic fibers commonly referred to as wood pulp fluff. Other natural fibers, such as cotton, may also be employed to form the absorbent core. The absorbent core can have a density ranging from about 0.18-0.30 grams/cc. This density range allows the absorbent core to be sufficiently flexible to readily conform to the body of the wearer yet maintain sufficient rigidity for insertion into the pouch. In some embodiments, the absorbent core may have a density of about 0.24 grams/cc. The absorbent core may alternatively or additionally include a coform material composed of a mixture of cellulosic fibers and synthetic polymer fibers. For example, the coform material may be composed of an airlaid blend of cellulosic fibers and meltblown polyolefin fibers, such as polyethylene and/or polypropylene fibers. In addition, the absorbent core may have a dry thickness of about 3 to 5 mm or about 4 mm, as measured under a restraining pressure of 0.068 psi (0.47 kPa).

The absorbent core may also include an effective amount of an inorganic or organic high-absorbency (e.g., superabsorbent) material to enhance the absorptive capacity of the absorbent body. For example, the absorbent core can contain 5-95 weight percent high-absorbency material, and preferably includes about 30-70, 40-60, or about 50 weight percent of the high-absorbency material to provide more efficient performance. In some embodiments, the absorbent core can include equal amounts of fluff and superabsorbent. For example, in some embodiments, the absorbent core may include at least 14, at least 15, at least 16, at least 17, at least 18, or at least 19 grams of superabsorbent. In some embodiments, the absorbent core may include at least 14, at least 15, at least 16, at least 17, at least 18, or at least 19 grams of fluff. In some embodiments, the absorbent core may include about 19 grams of superabsorbent and about 19 grams of fluff. In other embodiments, the absorbent core may include about 17 grams of superabsorbent and about 17 grams of fluff.

Suitable inorganic high-absorbency materials include, for example, absorbent clays and silica gels. Organic high-absorbency materials can include natural materials, such as agar, pectin, guar gum and peat moss, as well as synthetic materials, such as synthetic hydrogel polymers. Such hydrogel polymers include, for example, carboxymethylcellulose, alkali metal salts of polyacrylic acids, polyacrylamides, polyvinyl ethers, hydroxypropyl cellulose, polyvinyl morpholinone, polymers and copolymers of vinyl sulfonic acid, polyacrylates, polyacrylamides, polyvinyl pyridine and the like. Other suitable polymers include hydrolyzed acrylonitrile grafted starch, acrylic acid grafted starch, and isobutylene maleic anhydride copolymers, and mixtures thereof. The hydrogel polymers are preferably lightly cross-linked to impart desired levels of water insolubility to the material.

In some embodiments, the wrap sheet may be woven or non-woven material and may be made of any suitable material. For example, the wrap sheet may be made of polypropylene, cellulosic tissue, and the like, and combinations thereof. In some embodiments, the wrap sheet may be nonwoven material made from spunbond polypropylene and may have a basis weight of about 10 gsm.

The intake layer or layers help to decelerate and diffuse surges or gushes of fluid that can be rapidly introduced into the absorbent insert. Desirably, the intake layer can rapidly accept and temporarily hold the fluid prior to releasing the fluid into the absorbent core of the absorbent insert. In some embodiments, the intake layer may be a through air bonded carded web composed of 40% hollow polypropylene fibers (6 denier) and 60% bicomponent fibers (6 denier) (bicomponent sheath: polypropylene core). In various embodiments, the intake layer may have any suitable basis weight. For example, the intake layer may have a basis weight of at least 30, at least 50, at least 75, at least 100, or at least 125 grams per square meter (gsm). In some embodiments, the intake layer may have a basis weight of about 128 gsm. Other examples of suitable intake layers are described in U.S. Pat. No. 5,486,166; U.S. Pat. No. 5,490,846; and U.S. Pat. No. 5,820,973. The entire disclosures of these patents are hereby incorporated by reference herein to the extent they are consistent (i.e., not in conflict) herewith.

In some embodiments, the absorbent insert may have a first intake layer and a second intake layer. In some embodiments, the first intake layer may be the same material as the second intake layer or may be different. In some embodiments, the first intake layer may have the same basis weight as the second intake layer or may be different.

In some embodiments, the absorbent inserts of the present invention may be characterized, at least in part, by specific absorbent properties. For example, in some embodiments, the absorbent inserts may have a total absorbent capacity of at least 600 grams, at least 650 grams, at least 700 grams, or at least 750 grams of 0.9% saline solution. In some embodiments, the absorbent inserts may have an absorbent capacity of about 740 grams or about 827 grams. The total absorbent capacity of the absorbent inserts may be determined by using the Retention Capacity Test Method. This test method measures the amount of fluid retained by an absorbent insert under external pressure. An initial weight of the absorbent insert is measured and then the absorbent insert is submerged in a 0.9% saline solution for 20 minutes. After the saturation time, 0.5 psi pressure is applied across the entire absorbent insert for 5 minutes and the excess saline solution is allowed to drain. After the pressure time, the weight of the saturated absorbent insert is measured. The total absorbent capacity is calculated as the saturated weight minus the initial weight.

In some embodiments, the absorbent inserts may have a first intake rate as measured through a first major surface and may have a second intake rate as measured through a second major surface which is opposite the first major surface. In some embodiments, the first major surface may be adapted for positioning towards the wearer's body and the second major surface may be adapted for positioning towards the fluid-impervious pouch (i.e., towards the wearer's garments). In some embodiments, the first intake rate and/or the second intake rate may be determined by the Cradle Intake Test method. This test measures the time required for an absorbent insert to absorb a specific volume of 0.9% saline solution (insult). The absorbent insert is positioned within a test cradle with the first major surface (body-facing surface) up and the second major surface (garment-facing surface) down toward the cradle to determine the first intake rate. The absorbent insert is positioned within a test cradle with the second major surface (garment-facing surface) up and the first major surface (body facing surface) down towards the cradle to determine the second intake rate. The insult location is located relative to the transverse center line of the pant. For products designed for wearers having a weight of 38 to 65 pounds, the insult location is 150 mm forward of the transverse centerline for boys and is 90 mm forward of the transverse centerline for girls and the insult volume is 120 ml for both. For products designed for wearers having a weight of 60 to 120 pounds, the insult location is 170 mm forward of the transverse centerline for boys and 80 mm forward of the transverse centerline for girls and the insult volume is 220 ml for both. The flow rate of the saline solution is 15 ml/sec and the saline has a temperature of 98.6 degrees F. The respective absorbent inserts are insulted a first time at the aforementioned locations, volumes, and flow rates. The time it takes for the absorbent insert to completely absorb the first insult is recorded. After 15 minutes, the respective absorbent inserts are insulted a second time at the aforementioned locations, volumes, and flow rates. The time it takes for the absorbent insert to completely absorb the second insult is recorded.

In some embodiments, the first intake rate may be less than 30 seconds for the first insult and less than 100 seconds for the second insult. In some embodiments, the second intake rate may be less than 30 seconds for the first insult and less than 100 seconds for the second insult. In some embodiments, the ratio of the first intake rate to the second intake rate for the first insult may be at least 1:3, at least 1:2, at least 1:1.5, or about 1:1.

In some embodiments, the absorbent inserts may be characterized by total absorbent capacity as a ratio of crotch width. In some embodiments, the products designed for wearers having a weight of 60 to 120 pounds may have an absorbent capacity of about 827 grams and a crotch width of about 74 mm. In other embodiments, the products designed for wearers having a weight of 38 to 65 pounds may have an absorbent capacity of about 740 grams and a crotch width of about 74 mm. Thus, in some embodiments, the ratio of total absorbent capacity to crotch width may be at least 9 g/mm, at least 10 g/mm, or at least 11 g/mm.

The absorbent inserts of the present invention may be provided in any suitable manner. For example, any of the absorbent inserts described herein may be folded, stacked, wrapped, compressed, or the like, and combinations thereof. In some embodiments, the absorbent inserts may be individually wrapped in a wrapper. In some embodiments, the absorbent inserts may be folded one or more times before being placed in a wrapper. In some embodiments, the absorbent inserts may be folded twice before being placed in the wrapper.

In some embodiments, the absorbent inserts of the present invention include a first sheet, a second sheet, an intake layer, and an absorbent core. In these embodiments, the absorbent core may be positioned between the first sheet and the second sheet. Additionally, the intake layer may be positioned between the first sheet and the absorbent core. In this configuration, the first sheet is designated the body side and the second sheet is designated as the garment side of the absorbent insert.

In various embodiments, any of the absorbent inserts described herein may be folded a first time such that a first portion of the body side is in facing relation with a second portion of the body side. In these embodiments, the absorbent insert may be folded a second time such that a third portion of the body side is in facing relation with a first portion of the garment side. In other embodiments, the absorbent insert may be folded a first time such that a first portion of the garment side is in facing relation with a second portion of the garment side. In these embodiments, the absorbent insert may be folded a second time such that a third portion of the garment side is in facing relation with a first portion of the body side.

In some embodiments, the first fold may be positioned such that the absorbent insert is effectively folded into equal halves. In some embodiments, the first fold and the second fold may be positioned such that the absorbent insert is effectively folded into approximately equal thirds.

In various embodiments, the folded absorbent inserts may be individually packaged in any suitable wrapper material. Conventionally, the wrapper consists of one or more layers of a thin sheet or film of thermoplastic material, such as polyethylene, which is folded around the absorbent article and then sealed by the use of heat and/or pressure, ultrasonics, or an adhesive to form a package or pouch. In various embodiments, the wrapper may include films made from poly(vinyl alcohol), polyvinyl acetate, ethylene vinyl alcohol, polyurethane, ethylene methyl acrylate, and ethylene methyl acrylic acid to make them breathable. In some embodiments, the wrapper material may also be a laminate of different materials, such as a film/nonwoven laminate. The package may have a sealed side or edge that is designed to be opened by breaking or tearing the material at or adjacent the seal in order to subsequently remove the absorbent insert. With some package designs, a flap is provided that folds over the pouch opening and may attach to the front of the pouch with adhesive applied between the pouch and flap, or with a piece of adhesive tape. The sides of the flap may be sealed with the sides of the pouch and may be separated prior to removing the absorbent article.

The containment pants and the absorbent inserts of the present invention are adapted to work together as a containment system. In various embodiments, the containment system includes one or more containment pants like those described herein and one or more absorbent inserts like those described herein. Suitable containment systems are also described in patent application U.S. Ser. No. 13/548,012, entitled “Containment System”, filed on Jul. 12, 2012, the entirety of which is incorporated herein by reference.

In use and prior to donning, the absorbent inserts are positioned within the pouch which is suspended within the containment pant. After the absorbent insert is positioned, the containment system is pulled into place like conventional underwear. The containment pant is adapted to hold the absorbent insert in position which, in turn, is adapted to accept one or more urine insults from the wearer. The absorbent insert is adapted to rapidly intake and absorb the urine. The pouch is fluid-impervious and is adapted to hold any urine that may not be immediately absorbed by the absorbent insert. In some embodiments, the absorbent insert is fluid permeable on the garment-facing surface and/or on the side edges as well as the body-side surface. As such, any urine retained by the fluid-impervious pouch may be drawn into the absorbent insert via the garment-facing surface and/or the side edges. The used absorbent insert can be removed from the fluid-impervious pouch and the containment pant may be laundered prior to reuse with a new absorbent insert.

In various embodiments, the absorbent inserts of the present invention may be secured in the pouches of the containment pants by any suitable means. For example, the absorbent inserts may be secured in the pouches via buttons, snaps, hook and loop fasteners, pressure sensitive adhesive, clasps, and the like, and combinations thereof. In some embodiments, the absorbent inserts may be additionally or alternatively held in place by the structure of the containment flaps of the fluid-impervious pouch. For example, the containment flaps may include end pockets that help secure a portion of the absorbent insert within the pouches. In some embodiments, the containment flaps may include one or more positioning keys that are adapted to align and engage with one or more positioning notches in a coordinated absorbent insert. In some embodiments, the containment flaps may include flap elastic that provides retractive forces that assist in securing the absorbent insert within the pouch. In some embodiments, the absorbent inserts are held in place only by the structure of the containment flaps and/or end pockets. In some embodiments, the absorbent inserts are held in place only by the structure of the containment flaps and the containment flap elastic and are devoid of fasteners. In some embodiments, the absorbent inserts are devoid of containment flaps. In these embodiments, the containment of the fluid is managed by the containment flaps of the pouch.

In various embodiments, the containment system may include a containment pant having a pouch with a pouch floor area, a length, width, and/or shape adapted to accommodate a specific absorbent insert having a complementary absorbent insert and/or absorbent core area, length, width, and/or shape. This complementary area, length, width, and/or shape is believed to improve the absorbent insert placement on the body, to help contain the absorbent insert within the pouch, and to provide a smooth discrete fit and appearance for discretion.

In some embodiments, a containment pant may have a pouch with a pouch floor having a pouch floor length. Likewise, the absorbent insert may have an absorbent insert length and/or an absorbent core length that is less than or equal to the pouch floor length. In some embodiments, the absorbent insert length and/or an absorbent core length may be at least 70%, at least 80%, at least 90%, or at least 95% the pouch floor length. In one embodiment, the absorbent core length may be 91% of the pouch floor length. In these embodiments, the absorbent insert length and/or an absorbent core length may be 100% or less of the pouch floor length. Having an absorbent insert length and/or an absorbent core length to pouch floor length in these ranges is believed to keep the absorbent insert secure within the pouch without excessive bunching or shifting that may adversely affect performance and/or comfort. An absorbent insert shorter than this range would be more likely to shift or breach the pouch gasket which would likely result in leakage. An absorbent insert longer than this range would be more likely to buckle and bunch within the pouch and may result in a poor user experience due to discomfort and/or loss of discretion.

In some embodiments, a containment pant may have a pouch with a pouch floor having a pouch floor maximum width and a pouch floor minimum width wherein the maximum width and the minimum width are different. Likewise, the absorbent insert may have an absorbent insert and/or absorbent core maximum width and an absorbent insert and/or absorbent core minimum width wherein the maximum width and the minimum width are different. In some embodiments, the absorbent insert and/or the absorbent core maximum width is at least 80%, at least 90%, or at least 95% the pouch floor maximum width. In one embodiment, the absorbent core maximum width is 85% of the pouch floor maximum width. In these embodiments, the absorbent insert and/or absorbent core maximum width may be 100% or less of the pouch floor maximum width. In some embodiments, the absorbent insert and/or the absorbent core minimum width is at least 80%, at least 90%, or at least 95% the pouch floor minimum width. In one embodiment, the absorbent core minimum width may be 91% of the pouch floor minimum width. In these embodiments, the absorbent insert and/or the absorbent core minimum width may be 100% or less of the pouch floor minimum width.

In some embodiments, a containment pant may have a pouch with a pouch floor having a pouch floor maximum width in a front portion and/or a back portion and a pouch floor minimum width at a central portion wherein the maximum width and the minimum width are different. Likewise, the absorbent insert and/or absorbent core may have an absorbent insert and/or absorbent core maximum width in a front portion and/or a back portion and an absorbent insert and/or absorbent core minimum width at a central portion wherein the maximum width and the minimum width are different. In some embodiments, the minimum width of the pouch floor may be less than 80%, less than 70%, less than 60%, or about 62% the maximum width of the pouch floor. Similarly, the minimum width of the absorbent insert and/or absorbent core may be less than 80%, less than 70%, less than 60%, or about 62% the maximum width of the absorbent insert and/or absorbent core.

In one embodiment, the present invention is a method for providing a containment system. The method includes providing a permanently closed containment pant having a pouch like those disclosed herein. The pouch defines a pouch floor having a longitudinal direction, a first end section, a second end section, and a central section extending between the first end section and the second end section. The first end section, the second end section, and the central section define equal lengths in the longitudinal direction and together define a pouch floor length. The first end section defines a maximum width of at least 130 mm, at least 140 mm, at least 150 mm, or at least 165 mm, the central section defines a maximum width of less than 110 mm, less than 100 mm, less than 95 mm, and the second end section defines a maximum width of at least 130 mm, at least 140 mm, at least 150 mm, or at least 165 mm. The permanently closed containment pant is substantially devoid of an integrated absorbent core. The method further includes providing a discrete absorbent insert like those disclosed herein. The discrete absorbent insert includes an absorbent core that defines a longitudinal direction, a first end section, a second end section, and a central section. The central section is positioned between the first end section and the second end section. The first end section, the second end section, and a central section define equal lengths in the longitudinal direction. The first end section defines a maximum width of at least 115 mm, at least 125 mm, or at least 135 mm, the central section defines a maximum width of less than 100 mm, less than 90 mm, or less than 85 mm, and the second end section defines a maximum width of at least 115 mm, at least 125 mm, or at least 135 mm. The discrete absorbent insert is devoid of a fluid impervious layer.

In some embodiments, a containment pant may have a pouch with a pouch floor having a pouch floor area. Likewise, the absorbent insert may have an absorbent insert area and/or absorbent core area that is less than or equal to the pouch floor area. In some embodiments, the absorbent insert area and/or absorbent core area may be at least 80%, at least 90%, or at least 95% the pouch floor area. In some embodiments, the absorbent core area is 76% of the pouch floor area. In these embodiments, the absorbent insert area and/or absorbent core area may be 100% or less of the pouch floor area. For example, in one embodiment, the absorbent core area may be about 42,218 mm^2 which is 76% of the pouch floor area of about 55,270 mm^2. In another embodiment, the absorbent core area may be about 36,296 mm^2 which is 76% of the pouch floor area of about 47,778 mm^2.

In some embodiments, a containment pant may have a pouch with a pouch floor having a pouch floor shape and the absorbent insert and/or absorbent core may have an absorbent insert shape and/or absorbent core shape that is substantially the same as the pouch floor shape. In one embodiment, the pouch floor may have a curvilinear perimeter in the shape of a bow-tie and the absorbent insert and/or absorbent core may have a curvilinear perimeter in the shape of a bow-tie of similar length and/or width. For example, the pouch floor may have a bow-tie shape like that illustrated in FIG. **28** and the absorbent core may have a bow-tie shape like that illustrated in FIG. **37**. In another embodiment, the pouch floor may have a curvilinear perimeter in the shape of a torch and the absorbent insert and/or absorbent core may have a curvilinear perimeter in the shape of a torch of similar length and/or width. For example, the pouch floor may have a torch shape like that illustrated in FIG. **11** and the absorbent core may have a torch shape like that illustrated in FIG. **38**.

In some embodiments, a containment pant may have a pouch with a positioning key having a positioning key width and a positioning key depth. Likewise, an absorbent insert may have an absorbent insert and/or an absorbent core positioning notch having a width and depth adapted to engage and partially surround a coordinated positioning key. For example, referring now to FIG. **58**, an exemplary containment system **568** is representatively illustrated. The containment system **568** includes a containment pant **570** and an absorbent insert **572**. The containment pant **570** also includes a pouch **574** having a positioning key **576**. The absorbent insert **572** includes a positioning notch **578** that is adapted to engage and partially surround the coordinated positioning key **576**. In various embodiments, the absorbent core positioning notch depth may be 75 to 125%, 90 to 115%, or about 110% of the pocket depth. This system **568** is believed to promote proper placement of the absorbent insert **572** within the pouch **574** of the containment pant **570** prior to donning. Additionally, it is believed that the interaction of the positioning notch **578** and the positioning key **576** helps maintain the relative positioning of the absorbent insert in the pouch during wear.

In some embodiments, the containment system of the present invention provides a first containment pant, a second containment pant, and an absorbent insert. In these embodiments, the first containment pant has a first configuration and the second containment pant has a second configuration that is different than the first configuration. For example, in some embodiments, the first containment pant may have a chassis designed for use by males like that illustrated in FIG. **1** while the second containment pant may have a chassis designed for use by females like that illustrated in FIG. **6**. The differences between the first containment pant and the second containment pant may include chassis shape, chassis design, sling construction, pouch construction, pouch location, and the like, and combinations thereof. For example, in the first containment pant, the pouch may be located more towards the front of the containment pant for better alignment with male anatomy. In contrast, in the second containment pant, the pouch may be more centrally located for better alignment with female anatomy.

In one embodiment, the present invention provides a method for providing a containment system that includes providing a first permanently closed containment pant like those disclosed herein and a second permanently closed containment pant like those disclosed herein. The first containment pant includes a first fluid-impervious pouch that defines a first pouch construction and a first pouch floor. The first pouch floor having a first end section, a second end section and a central section extending between the first end section and the second end section. The first end section of the first containment pant defines a maximum width of at least 135 mm, at least 145 mm, at least 155 mm, or at least 165 mm, the central section of the first containment pant defines a minimum width of less than 110 mm, less than 100 mm, or less than 95 mm, and the second end section of the first containment pant defines a maximum width of at least 135 mm, at least 145 mm, at least 155 mm, or at least 165 mm. Similarly, the second containment pant includes a second fluid-impervious pouch that defines a second pouch construction and a second pouch floor. The second pouch floor having a first end section, a second end section and a central section extending between the first end section and the second end section. The first end section of the second containment pant defines a maximum width of at least 135 mm, at least 145 mm, at least 155 mm, or at least 165 mm, the central section of the second containment pant defines a minimum width of less than 110 mm, less than 100 mm, or less than 95 mm, and the second end section of the second containment pant defines a maximum width of at least 135 mm, at least 145 mm, at least 155 mm, or at least 165 mm. In some embodiments, the first pouch floor defines a first pouch floor length and the second pouch floor defines a second pouch floor length that is 95% to 105% the first pouch floor length. Thus, the first pouch floor has the same or similar dimensions at the same or similar positions as does the second pouch floor. However, while the first pouch construction may be any suitable construction, including those disclosed herein, and the second pouch construction may be any suitable construction, including those disclosed herein, the first pouch construction may be different than the second pouch construction. For example, in some embodiments the first pouch construction may be like that illustrated in FIGS. **28-31** and the second pouch construction may be like that illustrated in FIGS. **17-22**.

In some embodiments, the first permanently closed containment pant includes a first containment sling having a first transition that is joined between the first fluid-impervious pouch and the front waist region. The first transition defines a length in a longitudinal direction. The first permanently closed containment pant includes a second transition that is joined between the first fluid-impervious pouch and the back waist region. The second transition defines a length in the longitudinal direction. In these embodiments, the second permanently closed containment pant includes a second containment sling having a first transition that is joined between the second fluid-impervious pouch and the front waist region. The first transition defines a length in a longitudinal direction. The second permanently closed containment pant includes a second transition that is joined between the second fluid-impervious pouch and the back waist region. In some embodiments, the length of the first transition of the first sling is greater than the length of the first transition of the second sling. In some embodiments, the length of the second transition of the first sling is less than the length of the second transition of the second sling.

However, despite the differences between the first containment pant and the second containment pant, both may be constructed with pouches having pouch floors having similar length, width, and/or shape. As such, a single absorbent insert may be provided for use with both the first containment pant and the second containment pant. For example, in some embodiments, the present invention provides a method for providing a containment system. The method includes providing a first permanently closed containment pant like those described herein and providing a second permanently closed containment pant like those described herein. The method also includes providing a discrete absorbent insert that is sized and shaped to work in conjunction with both the first containment pant and the second containment pant. In some embodiments, the first containment pant may include a first pouch and the second containment pant may include a second pouch having a similar size and shape to the first pouch. However, despite the similarities, the first containment pant and the second containment pant may have different chassis construction, pouch construction, sling construction, pouch placement, or other differences, or combinations thereof.

In some embodiments, the containment system of the present invention includes one or more absorbent inserts having a designated body side and a designated garment side. In other words, in some embodiments, the absorbent inserts are designed to be oriented with a particular side towards the user to maximize the performance of the absorbent insert. For example, in some embodiments, the absorbent insert may have a single intake layer located on one side of the absorbent core. In these embodiments, it is desirable for the user to orient the absorbent insert within the pouch such that the intake layer faces the user. In this orientation, the absorbent insert is positioned to intake fluid rapidly through the intake layer and retain the fluid in the absorbent core.

To assist users in properly orienting the absorbent insert in the pouch, various cues may be provided. In some embodiments, the absorbent insert may include a color on one or more of the components. In some embodiments, the absorbent insert may include an intake layer that has a color that is distinguishable from the other components of the absorbent insert. For example, in some embodiments, the intake layer may have a blue color and the surrounding components may have a white color. In these embodiments, the user may be directed to identify the blue intake layer and position it facing the body. In this way, the user has a simple visual cue to quickly, repeatably, and properly orient the absorbent insert within the pouch.

In some embodiments, the absorbent inserts may be provided folded in individual wrappers. In these embodiments, the absorbent inserts may be folded to define a direction of curvature. The absorbent inserts may be bi-folded, tri-folded, or the like. In these embodiments, the absorbent inserts may be folded such that the resulting curvature is directed to the side of the absorbent insert that is desirably oriented towards the wearer. For example, the absorbent insert may have a single intake layer located on one side of the absorbent core. The absorbent insert may be folded such that the absorbent insert is cupped towards the side having the intake layer. In use, this cupped formation naturally fits with the cupped formation of the pouches within the containment pants. As such, the user is cued to position the absorbent insert within the pouch with the intake layer oriented towards the body of the wearer.

While the invention has been described in detail with respect to specific embodiments thereof, it will be appreciated that those skilled in the art, upon attaining understanding of the foregoing will readily appreciate alterations to, variations of, and equivalents to these embodiments. Accordingly, the scope of the present invention should be assessed as that of the appended claims and any equivalents thereto. Additionally, all combinations and/or sub-combinations of the disclosed embodiments, ranges, examples, and alternatives are also contemplated.

The invention claimed is:

1. A discrete absorbent insert comprising,

a first sheet,

a second sheet in facing relation with the first sheet,

an absorbent core positioned between the first sheet and the second sheet, wherein the absorbent core defines a core perimeter which includes a first absorbent core positioning notch,

the first sheet and the second sheet extend beyond the core perimeter and are joined together to form a perimeter seal, the perimeter seal defines an absorbent insert perimeter which includes a first absorbent insert positioning notch, wherein the perimeter seal has a greater width within the absorbent core positioning notch as compared to the remainder of the absorbent core perimeter,

the first absorbent core positioning notch has a depth of 30 to 60 mm,

the first absorbent insert positioning notch has a depth of 30 to 60 mm, and

the first absorbent insert positioning notch is aligned with the first absorbent core positioning notch.

2. The discrete absorbent insert of claim **1** wherein the first absorbent insert positioning notch depth is 75 to 100% the first absorbent core positioning notch depth.

3. The discrete absorbent insert of claim **1** wherein the first absorbent core positioning notch has a mid-point width of 10 to 25 mm and the first absorbent insert positioning notch has a mid-point width of 1 to 15 mm.

4. The discrete absorbent insert of claim **1** wherein the first sheet and the second sheet extend a uniform amount beyond the entire core perimeter and the perimeter seal has a uniform width around the entire absorbent core perimeter.

5. The discrete absorbent insert of claim **1** wherein the absorbent core further comprises,

at least 40% superabsorbent,

an intake layer positioned between the first sheet and the absorbent core and having a basis weight of at least 85 gsm, and

an absorbent capacity of at least 600 g.

6. The discrete absorbent insert of claim **1** wherein the first sheet and the second sheet are fluid permeable.

7. The discrete absorbent insert of claim **1** wherein the discrete absorbent insert is devoid of a fluid-impervious layer.

8. The discrete absorbent insert of claim **1** wherein the absorbent core also defines a longitudinal direction, a first end section, a second end section, and a central section, wherein the central section is positioned between the first end section and the second end section and wherein the first end section defines a maximum width of at least 135 mm, the central section defines a maximum width of less than 90 mm, and the second end section defines a maximum width of at least 135 mm.

9. The discrete absorbent insert of claim **8** wherein the absorbent core also defines an absorbent core length as measured in the longitudinal direction and wherein the absorbent core length is 340 to 450 mm.

10. The discrete absorbent insert of claim **9** wherein the first absorbent core positioning notch is located in the first end section and the core perimeter includes a second absorbent core positioning notch located in the second end section, wherein,

the second absorbent core positioning notch has a depth of 30 to 60 mm,

the second absorbent insert positioning notch has a depth of 30 to 60 mm, and

the second absorbent insert positioning notch is aligned with the second absorbent core positioning notch.

11. A discrete absorbent insert comprising,

a first sheet,

a second sheet in facing relation with the first sheet, an absorbent core positioned between the first sheet and the second sheet, wherein the absorbent core defines a core perimeter which includes a first absorbent core positioning notch, at least 40% superabsorbent, and an absorbent capacity of at least 600 g,

an intake layer positioned between the first sheet and the absorbent core and having a basis weight of at least 85 gsm,

the first sheet and the second sheet extend beyond the core perimeter and are joined together to form a perimeter seal, the perimeter seal defines an absorbent insert perimeter which includes a first absorbent insert positioning notch, wherein,

the first absorbent core positioning notch has a depth of 30 to 60 mm,

the first absorbent insert positioning notch has a depth that is 75 to 100% the first absorbent core positioning notch depth, and

the first absorbent insert positioning notch is aligned with the first absorbent core positioning notch, and

wherein the absorbent core also defines a longitudinal direction, a first end section, a second end section, and a central section, wherein the central section is positioned between the first end section and the second end section and wherein the first end section defines a maximum width of at least 135 mm, the central section defines a maximum width of less than 90 mm, and the second end section defines a maximum width of at least 135 mm.

12. The discrete absorbent insert of claim **11** wherein the first absorbent core positioning notch is located in the first end section and the core perimeter includes a second absorbent core positioning notch located in the second end section, wherein the first absorbent insert positioning notch is located in the first end section and the absorbent insert perimeter includes a second absorbent insert positioning notch located in the second end section,

the second absorbent core positioning notch has a depth of 30 to 60 mm,

the second absorbent insert positioning notch has a depth of 30 to 60 mm, and

the second absorbent insert positioning notch is aligned with the second absorbent core positioning notch.

13. The discrete absorbent insert of claim **11** wherein the first absorbent insert positioning notch is a closed notch and comprises a line of weakness.

14. The discrete absorbent insert of claim **13** wherein the first absorbent core positioning notch has a midpoint width of 10 to 25 mm and is aligned with the first absorbent insert positioning notch.

15. The discrete absorbent insert of claim **12** wherein the first sheet and the second sheet extend a uniform amount beyond the entire core perimeter and the perimeter seal has a uniform width around the entire absorbent core perimeter.

16. The discrete absorbent insert of claim **12** wherein the first absorbent core positioning notch and the second absorbent core positioning notch have a midpoint width of 10 to 25 mm and are centered in a transverse direction.

17. A discrete absorbent insert comprising,

a fluid permeable first sheet,

a fluid permeable second sheet in facing relation with the first sheet,

an absorbent core positioned between the first sheet and the second sheet, wherein the absorbent core defines a longitudinal direction, a first end section, a second end section, and a central section, wherein the central section is positioned between the first end section and the second end section,

the absorbent core also defines a core perimeter which includes a first absorbent core positioning notch located in the first end section, a second absorbent core positioning notch located in the second end section, at least 40% superabsorbent, and an absorbent capacity of at least 600 g,

an intake layer positioned between the first sheet and the absorbent core and having a basis weight of at least 85 gsm,

the first sheet and the second sheet extend beyond the core perimeter and are joined together to form a perimeter seal, the perimeter seal defines an absorbent insert perimeter which includes a first absorbent insert positioning notch and a second absorbent insert positioning notch, wherein,

the first absorbent core positioning notch and the second absorbent core positioning notch have a depth of 30 to 60 mm and a mid-point width of 10 to 25 mm,

the first absorbent insert positioning notch and the second absorbent insert positioning notch have a depth that is 75 to 100% the first absorbent core positioning notch depth and the second absorbent core positioning notch depth respectively,

the first absorbent insert positioning notch is aligned with the first absorbent core positioning notch,

the second absorbent insert positioning notch is aligned with the second absorbent core positioning notch, and

the discrete absorbent insert is devoid of a fluid-impervious layer.

18. The discrete absorbent insert of claim **17** wherein the first end section defines a maximum width of at least 135 mm, the central section defines a maximum width of less than 90 mm, the second end section defines a maximum width of at least 135 mm, and the absorbent core also defines an absorbent core length of 340 to 450 mm as measured in the longitudinal direction.

19. The discrete absorbent insert of claim **17** wherein the first sheet and the second sheet extend a uniform amount beyond the entire core perimeter and the perimeter seal has a uniform width around the entire absorbent core perimeter.

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